Waste Reclassification and Closure Area F Impoundments Final Submittal Naval Weapons Industrial Reserve Plant McGregor, Texas

Southern Division
Naval Facilities Engineering Command
2144 Melbourne Street
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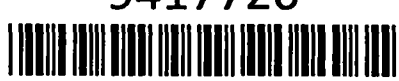
Charleston, South Carolina 29411

Contract No. N62467-81-R-0992
Modification P-00001
June 1984



SHANNON & WILSON, INC.

J-104-02

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WASTE RECLASSIFICATION AND CLOSURE
AREA F IMPOUNDMENTS - FINAL SUBMITTAL
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT
McGREGOR, TEXAS

Gentlemen:

Submitted herewith is our final report regarding reclassification of waste and closure of three surface impoundments within Area F of the Naval Weapons Industrial Reserve Plant near McGregor, Texas. This report is in partial fulfillment of Phase II of the above referenced contract and subsequent modification P-00001.

This report contains a brief summary of work accomplished prior to this effort, a discussion of requirements and history of this phase of the work, and detailed data regarding closure and reclassification of waste including numerous reports and pertinent correspondence to regulatory agencies.

Our study is complete with submittal of this report. It was our pleasure to work with you on this project. We appreciate your confidence in our firm and look forward to assisting you with other projects in the future.

Very truly yours,

SHANNON & WILSON, INC.

Ronald M. Eckelkamp, P.E.
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RME/ch

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PACNAVFACENGCOM (1)
NORTHWAVFACENGCOM (1)
CHESNAVFACENGCOM (1)
WESTNAVFACENGCOM (1)

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1.0 EXECUTIVE SUMMARY

Previous studies indicated that seepage from three surface impoundments on the west side of Area F of the Naval Weapons Industrial Reserve Plant in McGregor, Texas, was degrading the quality of the near-surface groundwater. The decision was made to close the impoundments and remove the waste to the satisfaction of appropriate govermental agencies.

Waste was removed from the impoundments between January 25 and July 12, 1983, in accordance with a closure plan submitted to the Texas Department of Water Resources. The bottoms of the impoundments were subsequently observed by a representative of the Texas Department of Water Resources and permission was given to backfill the impoundments. Backfilling was completed in the fall of 1983 and a certification of closure letter issued in January 1984.

Excavated waste from the impoundments was removed to Area S of the facility. Area S is a permitted thermal treatment area for explosive and reactive waste generated at the site. Testing of control samples and samples from Area S by the U.S. Bureau of Mines and other laboratories indicated that the waste in Area S contained less than 15 percent triaminotrinitrobenzene (TATB) and further, that waste with less than 15 percent TATB did not possess the characteristic (reactivity) of a hazardous waste.

Based on the reactivity test data and information furnished to the Texas Department of Water Resources by Hercules, Inc. concerning construction of Area S, the Texas Department of Water Resources determined that the waste from these impoundments was nonhazardous and, hence, disposal has recently been approved in a newly developed Class II landfill within Area S.

2.0 STUDY OBJECTIVES

Previous studies by Shannon & Wilson, Inc. indicated contamination of wells downgradient of the west surface impoundments of Area F.[1] The total organic halogen content parameter of the wells indicated a statistically significant increase.

Based on data generated during the referenced study, the decision was made by others to affect closure of the impoundments. Shannon & Wilson, Inc. was assigned with two objectives, certification of closure and preparation of a delisting petition. A brief description of the requirements of each are given below. The individual tasks are discussed in more detail in Sections 4.0 and 5.0.

2.1 Delisting Petition

Shannon & Wilson, Inc. was to develop the necessary engineering documentation for a petition to request the delisting of the subject hazardous waste. It was to include all sampling, testing, documentation and reporting as outlined by 40 CFR Part 261 and applicable state regulatory requirements.

2.2 Closure

Shannon & Wilson, Inc. was also tasked with the certification of closure of the surface impoundments. This included liaison with the Texas Department of Water Resources (TDWR), EPA Region VI, and local regulatory officials. The project involved, at a minimum, the development of a sampling plan, closure plan, post closure plan, and technical advice to Hercules Inc. during excavation. Shannon & Wilson, Inc. was to consult with Hercules Inc. to verify that the removal and

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[1]"Groundwater Quality Assessment Area F Final Submittal Naval Weapons Industrial Reserve Plant, McGregor, Texas," Shannon & Wilson, Inc. report to Southern Division Naval Facilities Engineering Company, Report J-104, February 1983.

storage procedures satisfied the requirements of state and federal regulations. Finally, Shannon & Wilson, Inc. was to develop a summary report for the delisting and closure activities including photographs, data collection, descriptive documentation, and recommendations.

3.0 PROJECT SYNOPSIS

3.1 Assessment Survey

An assessment to determine past hazardous materials management operations was conducted at the Naval Weapons Industrial Reserve Plant (NWIRP) near McGregor, Texas in 1981.[2] Individual areas were studied and significant findings, conclusions, and recommendations were given. The site and Area F are located as shown on Figures 3.1, 3.2, and 3.3; an aerial photograph of the impoundments is shown on Figure 3.4. Among other conclusions, it was stated that within Area F there was a potential for surface water and shallow groundwater contamination from wastewater discharged into three wastewater surface impoundments (ponds) on the west side of the area.

The wastewater is from the manufacture of triaminotrinitrobenzene (TATB) which is considered an explosive. Subsequently, a groundwater quality assessment study was authorized to determine the effect of the ponds and to satisfy requirements of TDWR and the Federal Resource Conservation and Recovery Act (RCRA) as managed by EPA.

3.2 Groundwater Quality Assessment

A groundwater monitoring well system was planned and thereafter installed in November 1982. Details concerning the system and its findings are given in a report prepared by Shannon & Wilson, Inc.[1] The purpose of the well system was to determine if the west impoundments were leaking into the groundwater as well as to provide background data for two impoundments on the east side of Area F. The east impoundments

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[2] "Navy Assessment and Control of Installation Pollutants, Initial Assessment Study of the Naval Weapons Industrial Reserve Plant, McGregor, Texas, Draft Report". Envirodyne Engineers, Inc. report to Naval Energy and Environmental Support Activity, September 1981.

were not used for storage of the hazardous waste, but since they possibly could have been used in the future, background data were collected.

Sampling of water within the wells was accomplished on a quarterly basis for a year to determine groundwater quality and measure groundwater parameters in accordance with the RCRA regulations then in effect. Results of analyses were submitted to appropriate governmental agencies.

Analyses of the first year's data indicate there was a significant possibility that the groundwater downgradient of the west impoundments was degraded. Continued operations of the impoundments would have subjected them to a semi-annual monitoring. In accordance with RCRA regulations which took effect January 26, 1983, additional monitoring and testing in the form of compliance monitoring and possibly corrective action would have been required as a response to finding a significant indication of contamination. These would have been expensive. It was considered more cost effective to close the ponds and develop a new wastewater treatment process.

3.3 Impoundment Closure and Waste Classification

The facility operator, Hercules Inc., submitted a closure request to TDWR for the three west impoundments of Area F. The plan was approved and then developed in greater detail by Shannon & Wilson, Inc. Closure efforts commenced in January 1983. The closure plan was modified and revised as necessary to meet changing field and agency requirements. Waste removal to Area S, a permitted thermal treatment area for propellant, was completed in the summer of 1983. Backfilling was completed in the fall of 1983 and a certification of closure letter issued in January 1984.

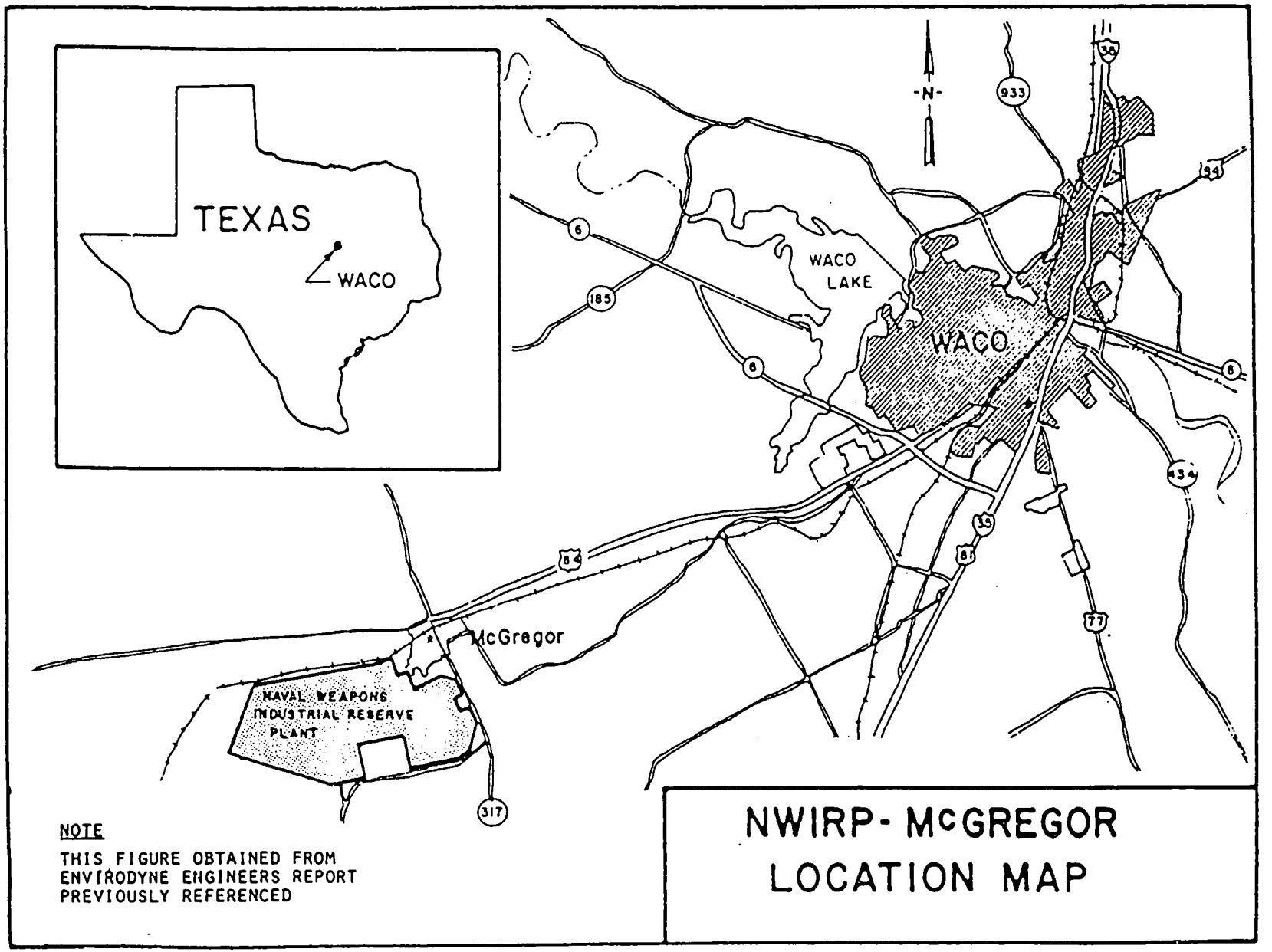
The waste removed from the impoundments is listed in the RCRA regulations as a K044 hazardous waste which is source specific. However, it was the opinion of those involved with the manufacturing process that the concentration of TATB in the

impoundments did not constitute a hazardous waste. Therefore, efforts were undertaken to demonstrate that the waste in the impoundments was nonhazardous.

Concentrations of TATB appeared to exist at the flume discharge into the basins, but elsewhere the percentage and/or occurrence of TATB appeared to be minor. A test program was developed to determine if sediment contaminated with as much as 15 percent TATB was reactive. (Infrared scans of waste excavated from the impoundments indicated TATB contents of less than 15 percent.) Mixtures of soil containing 1, 8, and 15 percent TATB were sent to laboratories to test the reactivity of this material in accordance with Title 40 CFR Part 261.23(a).

Test data indicated that a mixture of sediment with 15 percent or less TATB is nonreactive. Further, tests of impoundment waste stored in Area S indicated contamination levels less than 15 percent. Based on the above information and other legal considerations, TDWR considers the waste to be a nonhazardous waste which may be landfilled in Area S. According to TDWR, the design of a proposed Class II landfill within Area S is compatible with the waste characteristics of TATB.

Since the east impoundments are not used to store or treat hazardous waste, but were merely listed and monitored in the event they would be used in the future, they were deleted from the facility Part A permit by a modification request.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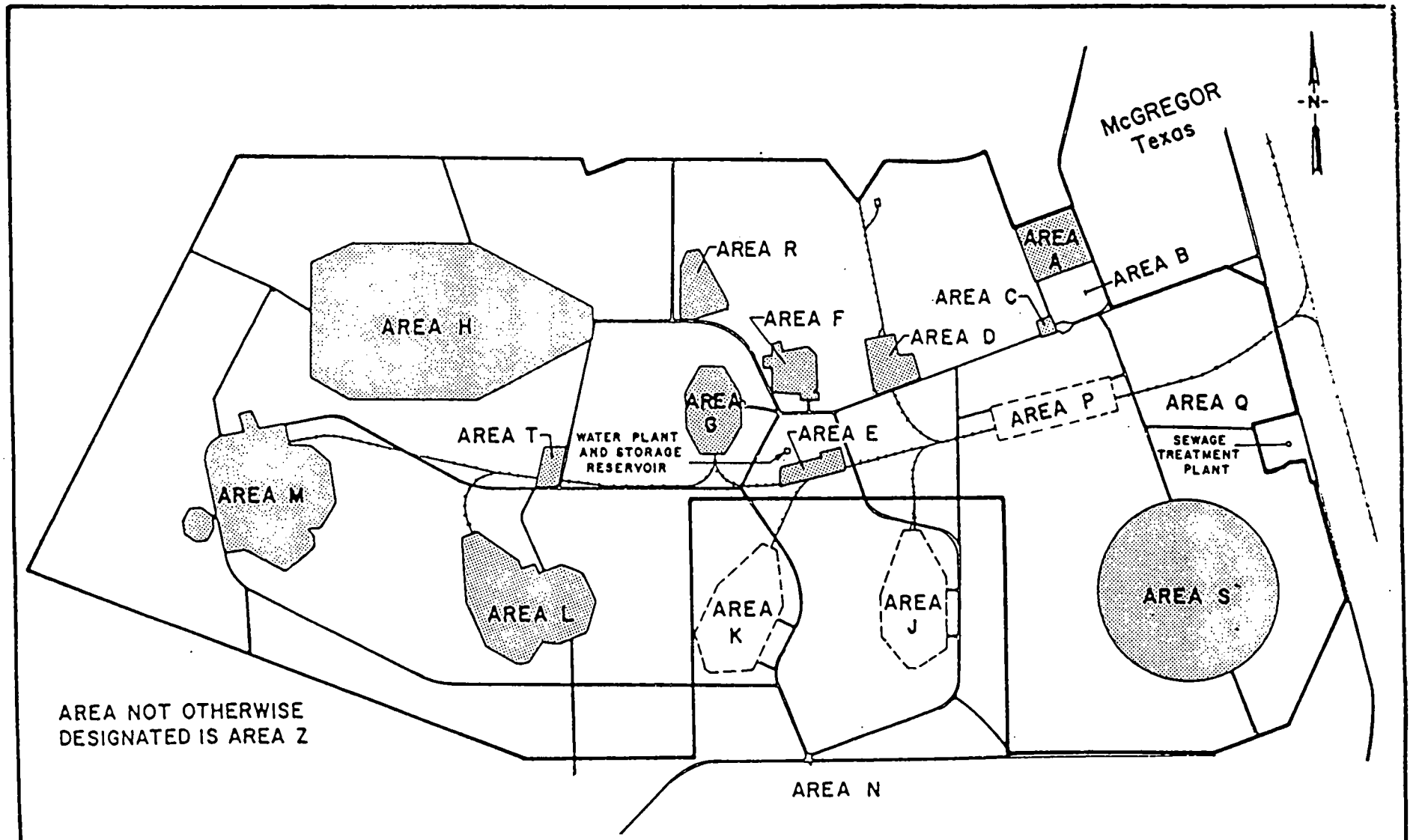
185
WACO LAKE
WACO
84
McGregor
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT
317
35
81
77
434
NOTE
THIS FIGURE OBTAINED FROM ENVIRODYNE ENGINEERS REPORT PREVIOUSLY REFERENCED
NWIRP- McGREGOR
LOCATION MAP

FIG. 3-1



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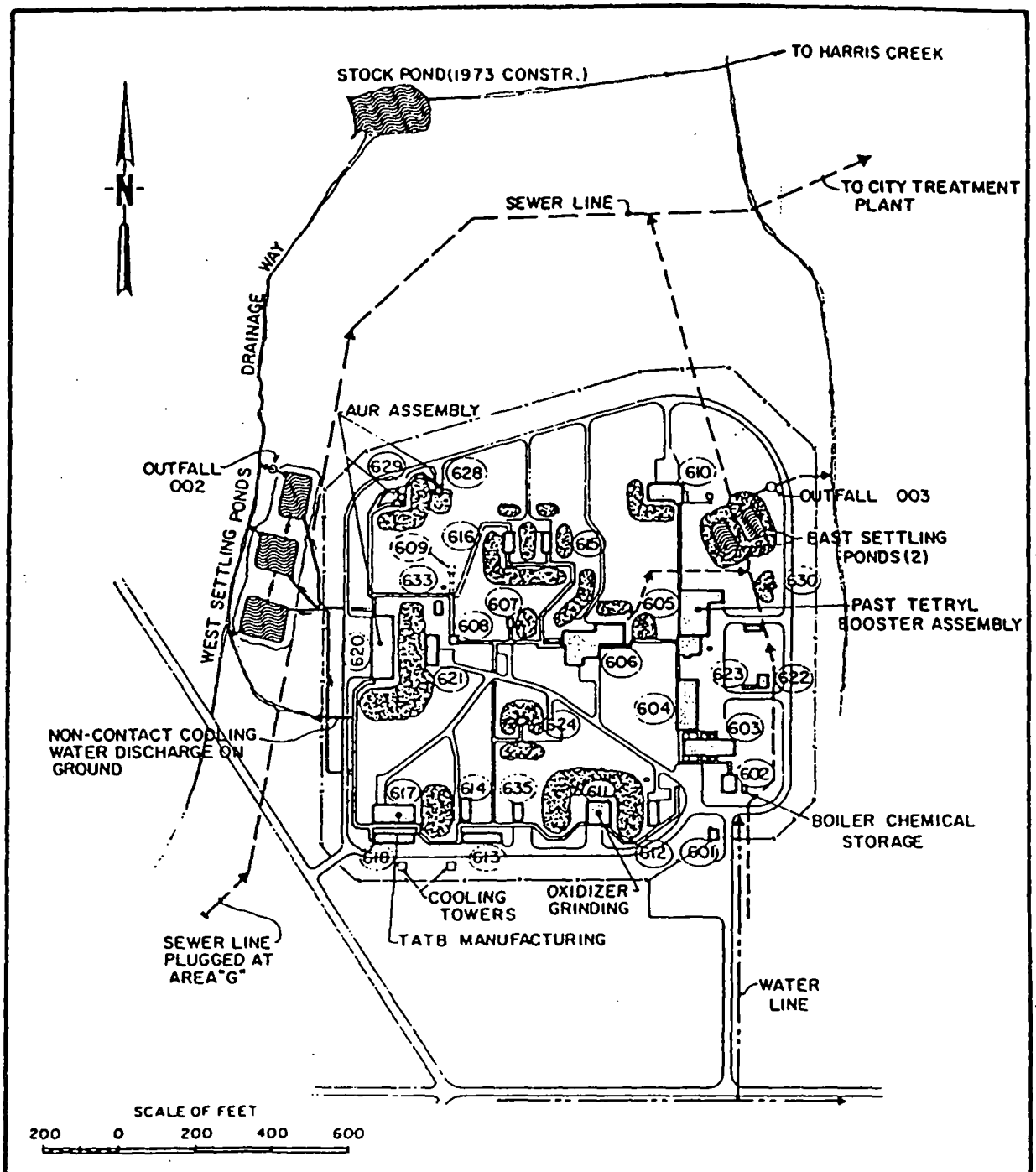
NWIRP- McGREGOR SITE LOCATION PLAN

FIG. 3-2



NOTE

THIS FIGURE OBTAINED FROM ENVIRODYNE ENGINEERS REPORT PREVIOUSLY REFERENCED.

AREA F

ENGINEERING LABORATORIES AND PILOT PRODUCTION

FIG. 3-3

Aerial photograph of Area F west impoundments prior to draining.
North is to left of the page.

FIG. 3-4

4.0 CLOSURE EFFORTS

4.1 Chronology

Closure efforts were initiated by Hercules Inc. through a closure request and amended closure plan dated October 25, 1982. The plan was sent to TDWR with the knowledge and approval of the Southern Division Naval Facilities Engineering Command (NAVY). Closure was authorized by Mr. Henry Davis, Executive Director of TDWR, by correspondence of November 23, 1982. A more detailed closure plan was submitted to TDWR by Shannon & Wilson, Inc. in a letter dated January 18, 1983.[3] This plan as well as the initial closure request and subsequent approval by TDWR are given in Appendix I.

Removal of waste sediments commenced January 25, 1982, and continued intermittently through July 12, 1983. Periodic delays were experienced because of adverse weather conditions and experimentation with removal methods. The initial closure plan was superseded by a Revised Closure plan issued on June 21, 1983.[4] The revised plan was based on procedures developed during the early stages of closure and is shown in Appendix II. A proposed alternate to the initial plan dated March 22, 1983, was not implemented but is shown herein as Appendix III[5].

After removal of waste sediments, the impoundments were determined to be clean and were backfilled. Certification of closure was issued by Shannon & Wilson, Inc. to TDWR by correspondence of January 25, 1984[6] and is reproduced herein as Appendix IV. Photographs of the impoundments prior to removal of the waste are shown on Figures 4-1 and 4-2.

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[3]"Closure Plan, NWIRP-McGregor, Texas." Shannon & Wilson, Inc. correspondence to TDWR, January 18, 1983.

[4]"Revised Closure Plan, Three Hazardous Waste Surface Impoundments, NWIRP-McGregor, Texas." Shannon & Wilson, Inc. correspondence to TDWR, January 21, 1983.

[5]"Proposed Alternate to Closure Plan Procedure, NWIRP-McGregor, Texas." Shannon & Wilson, Inc. report to TDWR, March 22, 1983.

4.2 Closure Plan

4.2.1 Plan of January 18, 1983. This closure plan was prepared to amplify the closure plan outline submitted by Hercules Inc. to TDWR. A seven-phase approach was proposed as follows:

I. Decontamination of flumes and removal and decontamination of impoundment piping;
II. Removal of impoundment wastewater;
III. Removal and disposal of waste TATB;
IV. Sampling the remaining non-TATB sediment waste (which was below the TATB), testing for reactivity, and preparation of a delisting petition;
V. Removal of sediment waste to temporary storage pending a decision on the delisting petition;
IV. Backfilling of the impoundments; and
VII. Disposal of the non-TATB sediment based on the outcome of the delisting petition.

The phased approach was developed based on visual observation of impoundment conditions prior to drainage. A complete assessment was not possible until the impoundments were drained. It was assumed that the waste TATB in the base of the impoundment was similar to that exposed on its banks; that is, a thin layer of sediment contaminated with TATB underlain by the sand liner. It was believed that once the TATB was removed, the remaining sediment in the form of the sand liner could be sampled and tested to demonstrate that it was nonreactive and, hence, not a hazardous waste. The sediment was to be stored temporarily on site pending the outcome of the delisting petition.

4.2.2 Plan of March 22, 1983. Phases I and II of the closure plan were completed and Phase III was underway by early March 1983. Since the impoundments were drained, it was possible to obtain small quantities of the TATB sediment and the

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[6]"Closure of Area F, West Surface Impoundments, NWIRP-McGregor, Texas." Shannon & Wilson, Inc. report to TDWR, January 25, 1984.

underlying sand liner. Observation of samples indicated a clear delineation between TATB and the sand liner. Further, flame and impact sensitivity tests on the sand did not indicate a positive response.

Based on these data, an alternate to the closure plan was developed. The difference between this and the initial plan was that, under this plan, the sand sediment would remain in place in the impoundments until reactivity tests could be completed. If the tests, in conjunction with infrared scans and leachate tests, demonstrated the sand to be nonreactive, it was proposed that the sediment be downgraded from a Class I Hazardous Waste. The sand would then be left in place and covered during backfilling of the impoundments.

4.2.3 Plan of June 21, 1983. The procedures given in the closure plans of January and March 1983 were discarded in favor of the revised closure plan of June 21, 1983. The revised plan was necessitated by field conditions. Excavation of waste sediments indicated that sediment was occasionally intermixed with the underlying sand liner which was previously thought to be uncontaminated. As a result, the closure plan was changed to a six-phase program. Phases III and IV of the initial closure plan were incorporated into Phase III of the revised closure plan; otherwise, the proposed program was about the same. Field conditions required that the TATB and underlying sand liner be removed together. All the excavated material was removed to the Area S thermal treatment area. Greater detail and definition were given to several phases in the Revised Closure Plan. The six-phase program included the following:

I. Decontamination of flumes and removal and decontamination of impoundment piping;
II. Removal of impoundment wastewater;
III. Removal and disposal of waste TATB and underlying sand liner;
IV. Sampling of disposed sand liner and sediment waste, and testing for reactivity;

V. Backfilling of the impoundments; and
VI. Sampling and testing of burned waste.

A copy of the plan is given in Appendix II.

The removal, testing, and treatment of impoundment sediments was accomplished in general accordance with the given plan with the exception noted in Section 4.3

4.3 Impoundment Waste Removal

Excavation and removal of impoundment sediment were accomplished in accordance with procedures given in the revised closure plan. Prior to using a rubber tired front-end loader, attempts were made to excavate the TATB by hand excavation and also with a Gradall, but these methods proved ineffective. Excavation of the impoundments and removal of the waste was accomplished by Hercules Inc. employees. Day-to-day activities and project safety were the responsibility of Hercules Inc.

4.3.1 Excavation. Excavation was accomplished with a rubber tired front-end loader as shown in the photograph on Figure 4-3. The material from the north and middle impoundments was removed in two layers. To the extent possible, the end loader excavated the top layer of heavily contaminated TATB and then excavated the sand liner to the top of lime rock. Because of the extent of contamination in the south impoundment, the TATB and sand were removed as one layer.

4.3.2 Disposal. The excavated material was hauled from the site by dump truck to the Area S thermal treatment area for processing as discussed in a subsequent section. Spillage and contamination during the removal process was prevented by lining the bed of the dump trucks with polyethylene sheeting. The exteriors of the trucks were washed prior to leaving the impoundments or Area S burn pit if exterior contamination occurred.

The excavated materials were end-dumped on the west side of the Area S thermal treatment area in three areas. The top layer of sediment and the underlying sand from the

northernmost impoundments were deposited in their own area, while the south impoundment waste was deposited in another area. A total of about 1400 cubic yards of sediment was deposited in Area S. An aerial photograph of the Area S disposal area prior to waste disposal is shown on Figure 4-4.

4.3.3 Processing. TATB will burn if subjected to a high temperature and/or initiating source. As part of the closure plan, sediments contaminated heavily with TATB such as from the south impoundment were to be mixed with fuel oil or other materials to initiate buring of the TATB in Area S. Area S is listed as a thermal treatment area for propellant and explosive contaminated waste in the Texas Department of Water Resources Permit Application for Industrial Solid Waste Storage/Processing Disposal Facility, Part A - Facility Background Information submitted to TDWR by Hercules Inc. The facility has EPA, TSD Facility Number TXD000453399 and TDWR generator registration Number 30056. The Texas Air Board was contacted and permitted open burning of this material.

Several trial burns were conducted but the test data showed no significant decrease in TATB concentrations after burning. Additional test burns were unnecessary as it was later determined that waste containing less than 15 percent TATB is nonreactive. Further, the waste sediment does not meet the definition of a hazardous waste and hence was classified by TDWR for final disposal in a newly created Class II landfill within Area S.

4.4 Backfilling and Final Closure

The bases of the impoundments were observed by representatives of TDWR, Hercules Inc. and Shannon & Wilson, Inc. on July 12, 1983. At that time, the impoundments were determined to be clean and permission was given to commence backfilling. Photographs of the cleaned impoundments are shown on Figures 4-5 and 4-6. A memo from TDWR dated August 9, 1983, and given herein as Attachment 5 of Appendix IV states, "Clean-up

operations appear to have been satisfactory and the impoundments free from contaminated material".

Backfilling was accomplished by Hercules Inc. in accordance with Phase VI requirements of the final closure plan. Backfilling was completed during the last week of October 1983. The backfilled impoundments were again observed by a representative of TDWR, Hercules Inc., and Shannon & Wilson, Inc. on November 14, 1983. The impoundments were determined to be properly closed. A memo to this effect is enclosed as Attachment 6 of Appendix IV. Photographs of the backfilled impoundments are shown on Figures 4-7 and 4-8.

4.5 Certification of Closure

Shannon & Wilson, Inc. issued certification of closure for the west surface impoundments of Area F on January 25, 1984.[6] A copy is included herein as Appendix IV. As stated in the correspondence, the term "certification" is a professional opinion as defined in the Federal Register, Vol. 47, No. 143; Monday, July 26, 1982, page 32349, 40 CFR Part 260.10. It was submitted as required by Section 335.216 of the Texas Administrative Code and as set forth by the Texas Water Development Board in Industrial Solid Waste Rules.

View to northeast of south impoundment prior to complete drainage.

Pumping of contaminated water from impoundment.

FIG. 4-1

North impoundment looking north prior to removal of waste and sand liner.

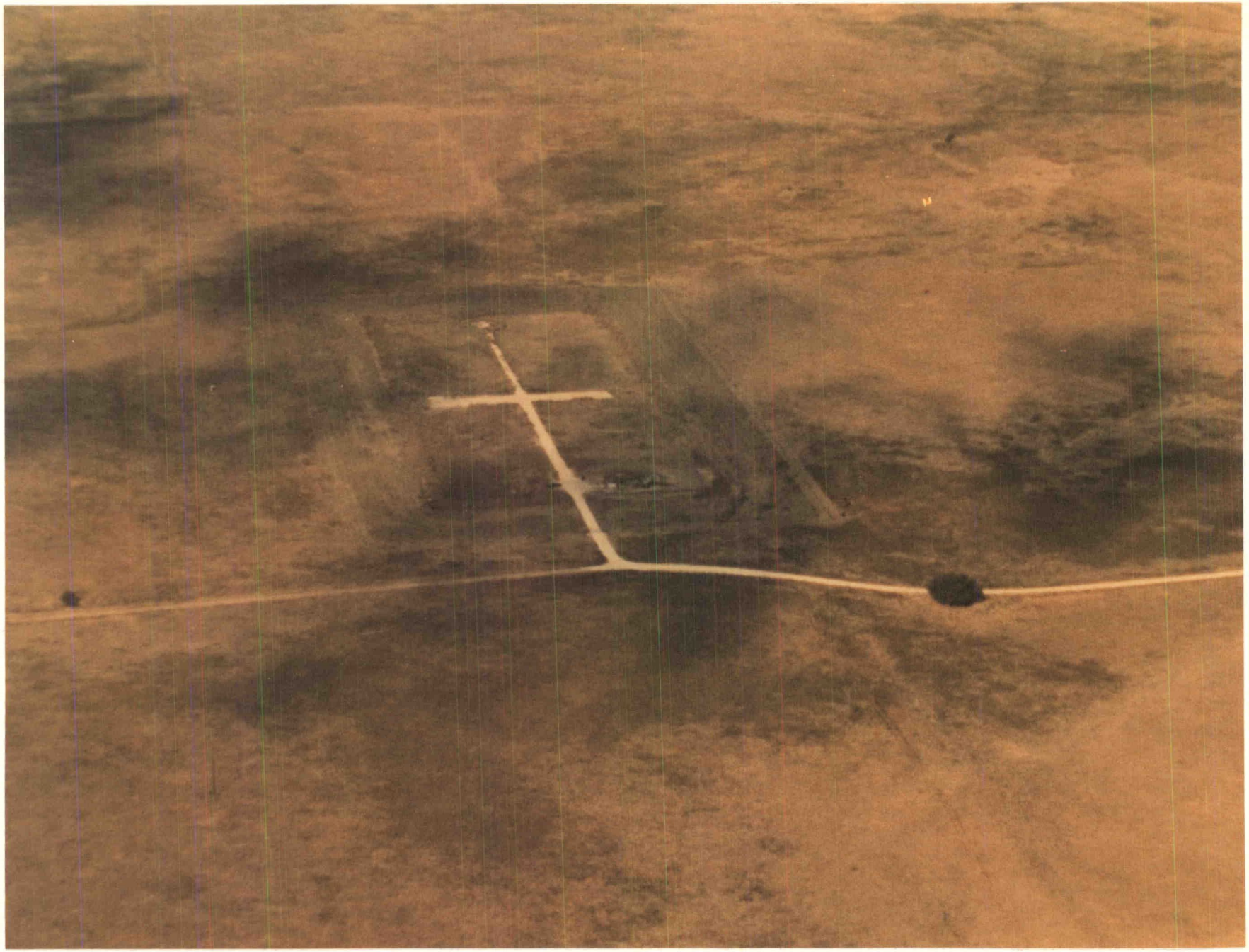
North end of north impoundment looking west. Note stratification of waste and underlying sand liner.

FIG. 4-2

Excavation of waste from north impoundment.

Excavation of waste from north impoundment prior to excavation of sand liner.

FIG. 4-3



Aerial view of Area S looking west prior to waste disposal.

FIG. 4-4

Base of north impoundment after waste and sand liner removal looking to flume entry at south-east corner.

Base of north impoundment after waste and sand liner removal looking south.

FIG. 4-5

Base of middle impoundment after removal of waste and sand liner. View from southwestern corner looking east-northeast.

Base of south impoundment after removal of waste and sand liner. Water in impoundment is rain-water. View from south bank looking northeast.

FIG. 4-6

Backfilled south and middle impoundment. View from southwest corner of south impoundment looking northeast.

FIG. 4-7

Backfilled south impoundment. View from northeast corner looking southwest.

Backfilled north impoundment. View from southeast looking northwest.

FIG. 4-8

5.0 IMPOUNDMENT WASTE RECLASSIFICATION

5.1 Alternatives to Reclassification of Waste

If the excavated waste from the impoundment had not been reclassified as nonhazardous by TDWR, it would have been necessary to dispose of the waste as a hazardous material. A number of options were available, all of which would have been expensive. Also, available technology was unproven when applied to an explosive. Still other methods would not have destroyed the waste and would have had an associated continued liability. The methods among others included:

- open burning;
- incineration;
- removal in barrels to a hazardous waste landfill;
- separation by centrifuge or other methods; and
- chemical or biological stabilization.

Ultimately, with the downgrading of the waste to a non-hazardous waste, it was considered to be more beneficial to permanently dispose of the waste in a newly created Class II landfill in Area S rather than send it to an off site landfill. The City of Waco, Texas, has a landfill licensed to accept Class II waste, however, if the waste were sent to the Waco landfill, the NAVY and Hercules Inc. as owner and operator, respectively, could be subject to future liability in the event problems developed due to operation and/or maintenance of the landfill or if more restrictive, retroactive government regulations were promulgated. The NAVY and Hercules Inc. are in a better position to handle potential problems with maintenance or governmental regulation by landfilling at the Area S site.

5.2 Methods for Reclassification

5.2.1 Delisting. The State of Texas generally has authority for its hazardous waste managment program. However, at the time this work was accomplished, it did not have authority to

exclude hazardous wastes as defined in 40 CFR Part 261 Subpart D. Rather, EPA Region VI has jurisdiction in these matters. The waste in the impoundments has a K044 classification (wastewater treatment sludges from the manufacture and processing of explosives) and is listed because of its potential reactivity.

Procedures and requirements for delisting are given in 40 CFR Parts 260.20 and 260.22. These regulations cross reference several other regulations, one of the more important of which states, "...the petitioner must show that demonstration samples of the waste do not exhibit the relevant characteristics defined in 261.21, 261.22, 261.23 or 261.24 using any applicable test methods prescribed therein." Since the waste is listed as a reactive material, the waste only needs to be tested for the characteristics defined in 261.23.

The above information was determined through conversations with Messrs. Sproat and Morse of EPA in Washington, DC, Mr. Wil Focht of EPA Region VI in Dallas, Texas, and Mr. Dick Martin of TDWR; a review of applicable state and federal regulations; and a review of delisting petitions submitted to EPA.

5.2.2 Downgrading. Texas Department of Water Resources determined that the waste in Area S was not hazardous because it no longer displayed the characteristics of hazardous waste as a mixture with nonhazardous waste. A letter dated February 16, 1984, from Mr. Gary Schroeder of TDWR given herein as Attachment V authorizes final disposal of the waste in a Class II landfill. TDWR made this assessment in accordance with 40/CFR Part 261.3(a)(2)(iii).

5.3 Reactivity Testing

The TATB waste was demonstrated to be nonreactive on the basis of flame ignition and impact sensitivity tests performed by Hercules Inc., but a more sophisticated program was required to establish that the waste was nonreactive. To this end, a program was developed to determine the point at which a mixture of TATB and soil became reactive. Field tests performed by

Hercules Inc. indicated that TATB levels in the waste were less than 15 percent. Additional data relative to the reactivity testing program is given in a report submitted to TDWR[7] and reproduced herein as Appendix VI.

5.3.1 Test Program. Few test protocols are available for determination of reactivity, particularly the explosivity of a material. Therefore, the EPA and US Bureau of Mines were contacted and acceptable test methods were developed. The latter agency was included since it is under contract to EPA to develop the explosivity guidelines pertaining to a reactive waste.

US Bureau of Mines was retained to test for characteristics defined by 40 CFR 261.23(a)(6) and (7) which deal with explosivity. Other tests were performed by General Engineering Laboratories of Charleston, South Carolina. Samples of soil containing 1, 8, and 15 percent were tested.

5.3.2 Test Data. Tests performed by both the US Bureau of Mines and General Engineering Laboratories did not indicate a reactive material. Test results are given on Attachments 4 and 5 of Appendix VI.

5.3.3 Conclusions of Tests. Based on data generated during the reactivity tests, it is our conclusion that mixtures of soil containing less than 15 percent TATB are nonreactive. The tests performed by General Engineering Laboratories and the US Bureau of Mines did not indicate any positive response. Further, for the characteristics tested by the US Bureau of Mines, they state: "It is concluded that the soil contaminated with up to 15 percent TATB does not exhibit the properties described in 40 CFR 261.23(a)(6) and (7) as contributing to the characteristic of reactivity, according to the test and criteria which we recommended to EPA for that purpose." Further, since the mixture of TATB and soil is not a forbidden explosive as defined in 49 CFR 173.51 or a Class A explosive as defined

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[7]"Reactivity Testing, TATB and Soil Mixture, NWIRP-McGregor, Texas." Shannon & Wilson, Inc. report to TDWR, dated April 2, 1984.

in 49 CFR 173.53 or a Class B explosive as defined in 49 CFR 173.88, it is our opinion that soil contaminated with 15 percent or less TATB is nonreactive.

5.4 Impoundment Waste Status

The 1400 cubic yards of waste are to be permanently landfilled in Area S. Texas Department of Water Resources has determined that the proposed landfill has parameters consistent with the characteristics of the waste. The most recent Industrial Solid Waste Registration (June 1984) for the facility from TDWR indicates that Area S is approved as a Class II landfill and that the waste from the impoundments meets the criteria of a Class II waste.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Submitted herein are our conclusions and recommendations regarding the closure of the west impoundments of Area F and reclassification of the excavated waste.

- Waste from the three impoundments was removed to the top of lime rock. Based on visual observation, the base of the impoundments appeared clean.
- The surface impoundments were backfilled and the ground contoured so as to channel water away from the impoundments.
- Certification of closure was issued by Shannon & Wilson, Inc. by correspondence of January 25, 1984.
- Approximately 1400 cubic yards of waste was removed to Area S.
- Samples of waste from Area S contained 15 percent or less TATB.
- Tests designed to determine characteristics of reactivity were performed on samples of soil mixed with 1, 8, and 15 percent TATB. The test data indicated the mixes were nonreactive.
- Texas Department of Water Resources has determined that the landfill of Area S has parameters consistent with the waste and that disposal of the waste in Area S is satisfactory. The waste and landfill have been given a Class II status.
- Other methods of waste disposal are costly, have potential future liabilities, or would rely on unproven technology.

APPENDIX I

CLOSURE PLAN
NWIRP-McGREGOR, TEXAS

CONSULTANTS
William L. Shannon, P.E.
Stanley D. Wilson, P.E.

SHANNON & WILSON, INC.
Geotechnical Consultants
Engineering And Applied Geosciences

5 Canty Lane, Suite 3 • Fairview Heights, Illinois 62208 • Telephone (618) 274-9339

January 18, 1983 J-104-02

Texas Department of Water Resources
P.O. Box 13087
Capitol Station
Austin, Texas 78711

Attention: Ms. Ann McGinley

RE: Closure Plan
NWIRP-McGregor Texas

Dear Ms. McGinley:

Submitted herewith is a closure plan for three surface impoundments located west of Area F at the Naval Weapons Industrial Reserve Plant (NWIRP) near McGregor, Texas. This plan is in general agreement with the closure plan submitted by Hercules Inc. to Texas Department of Water Resources (TDWR) on October 25, 1982, but is developed herein in more detail. The initial closure request is given in Appendix A. Closure was authorized by Mr. Henry Davis, Executive Director of TDWR by correspondence of November 23, 1982, also included in Appendix A.

Introduction

Since the impoundments received waste water from process and washdown operations from the manufacture of triamino trinitro benzene (TATB), a Class A explosive, the waste sludge is considered a hazardous waste from a specific source under 40CFR Part 261.32. The waste has a KO44 designation which is source specific because of potential reactivity.

The closure is being implemented in seven phases. The seven phases include:

I. Decontamination of flumes and removal and decontamination of impoundment piping;

II. Removal of impoundment waste water;

III. Removal and disposal of waste TATB;

IV. Sampling the remaining sediment waste, testing for reactivity, and preparation of a delisting petition;

V. Removal of sediment waste to temporary storage pending a decision on the delisting petition;

VI. Backfilling of the impoundments; and

VII. Disposal of the sediment based on the outcome of the delisting petition.

Phase I - Piping and Flume Decontamination

All flumes have been washed with water to remove hazardous wastes which may have settled in the flumes.

The piping which interconnects the impoundments will be removed during Phase V operations. The piping will be decontaminated by washing and stored for future use.

Phase II - Waste Water Removal

Waste water within the ponds was analyzed for pH, COD, NH_3-N, and oil and grease content to determine if it met requirements of NPDES permit #TX0034321. Since the testing indicated the water met permit requirements, it was removed to the extent possible by pumping and discharged to the adjacent drainage swale. The drainage was accomplished at a rate which did not exceed the permit specifications of 40,000 gallons per day or an average of 20,000 gallons per day. Waste water containing suspended solids was not discharged from the ponds.

Pumping removed most of the water except that which ponded in low areas or contained suspended solids. This remaining water plus water which accumulates in the impoundments because

of rain will be removed during Phase III. At that time water from the north and south impoundments will be pumped to the middle impoundment since the middle impoundment will be treated last during Phase III work. The water in the middle impoundment will be discharged to the adjacent drainage swale if it meets NPDES permit standards. Suspended solids, if any, will be removed by filtration. As an alternative, water may be pumped to a filtration system from each pond individually.

Phase III - TATB Waste Removal

The TATB waste will be removed and disposal accomplished by the facility contractor, Hercules Inc. Day-to-day activities and project safety will be the responsibility of Hercules Inc. Investigations by Hercules Inc. and Shannon and Wilson, Inc. indicate approximately 120 yd^3 and 50 yd^3 in the south and north impoundments, respectively. The middle impoundment appears to contain only trace amounts of TATB. A schematic diagram of the ponds and thicknesses of TATB are given on Plate 1.

Excavation - Excavation will be accomplished with a Gradall or equivalent type unit. The excavated material will be hauled from the site by dump truck to the Area S burn pit where it will be burned as discussed in a subsequent section. A site plan showing Area F and Area S is given on Plate 2. The location of the impoundments is shown on Plate 3.

Excavation will be accomplished to the extent possible from the banks of the impoundments. Impoundment berms may be lowered in order to accommodate construction equipment and/or improve the reach distance of the Gradall. The berms will not be lowered to closer than within six inches of the former water line. Surface runoff into the ponds will be prevented.

Similarly, to facilitate removal, a small roadway may be extended into the impoundment. Prior to road construction,

however, TATB and bottom sediment would be removed. The TATB would be disposed in Area S and the bottom sediment stockpiled in the pond or temporarily stored in Area H as discussed in Phase V. Disturbances to sediment during TATB removal will be minimal.

Spillage and contamination during the removal process will be prevented by the following measures. The bed of the dump trucks and the ground within the swing path of the Gradall will be protected by polyethylene sheeting. The exterior of the trucks will be washed prior to leaving the impoundments or Area burn pit if exterior contamination occurs.

The depth of TATB removal will be controlled by sludge color; TATB is characteristically yellow. After the yellow sludge is removed from an area, random samples will be obtained and ignition and impact sensitivity testing accomplished. Previous testing of TATB sludge had a positive response to ignition testing and generally a positive response to impact sensitivity testing at less than 119 inch-pounds. Sludge will be removed until flame and impact sensitivity test samples do not respond positively, but in no instance before all yellow sludge is removed.

Sludge removal is expected to commence by January 25, 1983 and will proceed as expeditiously as weather permits.

Disposal - The TATB sludge will be end dumped on the west side of the Area S burn pit. Deposit height will be limited to that which is incidental to the angle of repose of the material. The sludge will be burned periodically. The time interval and quantity will be determined by a trial process. The sludge may be burned in a pile or may be spread and allowed to air-dry. The actual process will depend on results of trial burns. If necessary, the sludge may be mixed with a petroleum product, such as Number 2 fuel oil, to initiate and/or sustain burning. The Texas Air Board has been contacted and are permitting open buring of this material.

Area S is listed as an open-burn area for propellant and organic processing material in the Texas Department of Water Resources Permit Application for Industrial Solid Waste Storage/Processing Disposal Facility, Part A - Facility Background Information submitted to TDWR by Hercules Inc. The facility has EPA, TSD Facility Number TXD000453399 and TDWR generator registration Number 30056.

Post-Removal Cleanup - At the conclusion of TATB sludge removal, the Gradall bucket and dump truck will be washed with water within the Area S burn pit. The bucket and dump truck bed will be flame tested prior to removal from NWIRP.

Phase IV - Delisting Petition

After removal of the TATB, the remaining sediment in the ponds is presumably that which was deposited prior to start of TATB pilot production in 1979. Sediment was deposited by roof runoff and washdown water. The washdown water occasionally contained ammonium perchlorate and ammonium nitrate. The sediment is believed to be nonreactive. Therefore, a delisting petition will be prepared for submittal to U.S.E.P.A. Since testing, petition preparation, and petition review could take six months or more, the sediment will be removed and placed in temporary storage as discussed in Phase V pending a petition ruling.

A sampling and analysis plan giving sampling techniques, sampling frequency, and testing methods is being developed and will be forwarded to TDWR for comments prior to initiating sampling. Sampling will be performed in general accordance with published EPA guidelines.[1] As a minimum, four samples from the impoundments will be tested. Testing will be accomplished in accordance with the requirements of 40CFR Part 260.20, 260.22, and 261.23. Explosivity testing will be performed by the U.S. Bureau of Mines; other tests will be per-

formed by a private laboratory. The U.S. Bureau of Mines is under contract with U.S.E.P.A. to perform their explosivity testing.

The Region III office of TDWR will be notified as to when sampling will occur so that a department representative can be present, if desired.

Phase V - Sediment Removal and Temporary Storage

The sediment will be removed and disposal accomplished by the facility contractor, Hercules Inc. An investigation by Hercules Inc. and Shannon & Wilson, Inc. indicated approximately 200 yd^3 of sediment. Sediment thickness is generally about one to seven inches thick.

Excavation - Although the sediment is believed to be inert, it is the product of a waste water from an explosive manufacturing process and, therefore, will be handled as a hazardous waste during the removal process. Removal will be accomplished in the same manner as excavation for Phase III except that the sediment will be removed to temporary storage in Area H. Area H is located as shown on Plate 2.

As-built construction plans for the impoundments indicate that sand was placed in the bottom of the impoundments as shown on Plate 4. Testing by Shannon & Wilson, Inc. and Hercules Inc. confirmed the existence of sand below the sediment. The sediment will be removed until clean sand is encountered or at the option of Shannon & Wilson, Inc. deeper, if sampling and testing indicate contaminated soil.

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[1] "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Published by the U.S. Environmental Protection Agency; Publication SW-846; 2nd Edition, 1982.

Samples of the bottom material will be obtained and tested by Hercules Inc. A negative reaction to ignition and impact sensitivity testing will be used as the criteria to conclude that a sufficient amount of material has been removed and backfilling may proceed as given in Phase VI.

Disposal - The sediment will be temporarily deposited within one of the 118 storage bunkers in Area H. These bunkers are constructed as explosive magazines, but use was discontinued when bomb protection ceased after WW II. Fifty six of these bunkers were rehabilitated and are presently in use by Hercules Inc.; the remainder have been abandoned in place. A schematic of a typical bunker is given on Plate 5. Prior to placement of sediment, the bunker will be lined with 6-mil polyethylene. A berm will be constructed on the open end of the bunker. Roofs of the bunkers have deteriorated and fallen. Therefore, a cover will be placed over the waste to protect it from runoff. Sediment will be end dumped into the bunker prior to construction of the cover.

Post-Removal Cleanup - At the conclusion of sediment removal, the Gradall bucket and dump truck will be cleaned similar to the procedures given in Phase III.

Phase VI - Backfilling

After it is determined that the sediment has been removed, backfilling will commence. On-site adjacent soils which are of the Denton Clay and San Saba Clay Soil Series will be used for backfill. These soils typically have a clay content ranging between 35 and 60 percent and contain limestone gravel and cobbles. The backfill will be graded so as to slope downward to the northwest. The impoundment berms will be breached to allow rapid drainage. Runoff other than that which falls within the limits of the impoundment will be diverted. The backfill will

be placed in thin lifts (6 to 8 inches) and the soil compacted with at least four passes of the earth moving equipment. The groundwater monitoring wells will be filled with grout.

Phase VII - Permanent Sediment Disposal

The sediment will be disposed of permanently based on results of the delisting efforts; disposal will be determined at that time.

* * * * *

We appreciate the cooperation you have provided on behalf of Texas Department of Water Resources. Please contact me if you have any questions or comments.

Very truly yours,

SHANNON & WILSON, INC.

Ronald M. Eckelkamp, P.E.
Principal Engineer

RME:jw

cc: Mr. Don Wyrick
Mr. Ken Chacey
Ms. Kathleen Anglin

Attachments:
Plate 1 West Impoundments
Plate 2 NWIRP-McGregor Site Location Plan
Plate 3 Area F Engineering Laboratories and Pilot Production
Plate 4 Area F Typical Section Through Settling Ponds
Plate 5 Storage Bunker Plan and Section
Appendix A - Hercules Inc. Closure Request and TDWR Closure Authorization

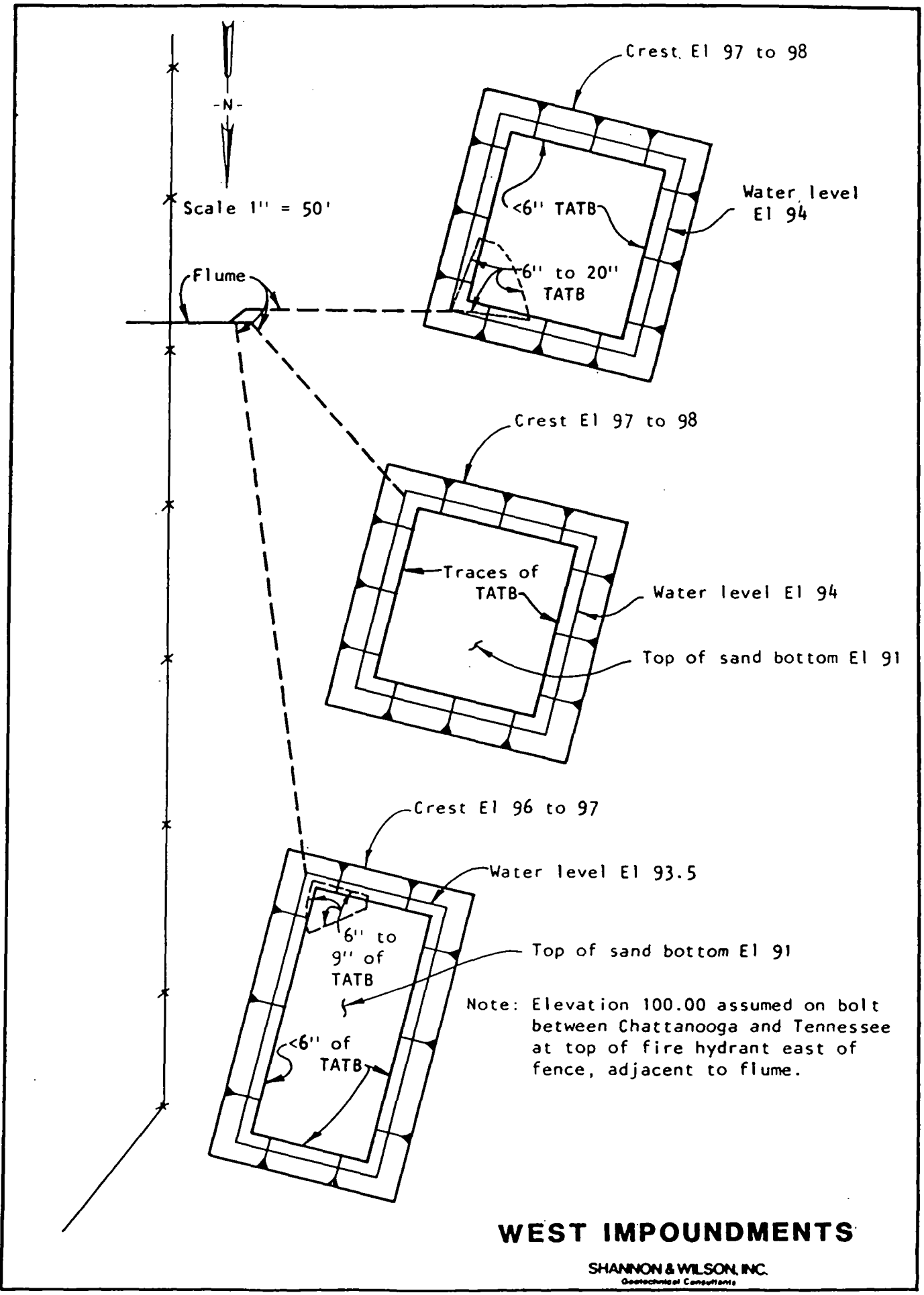
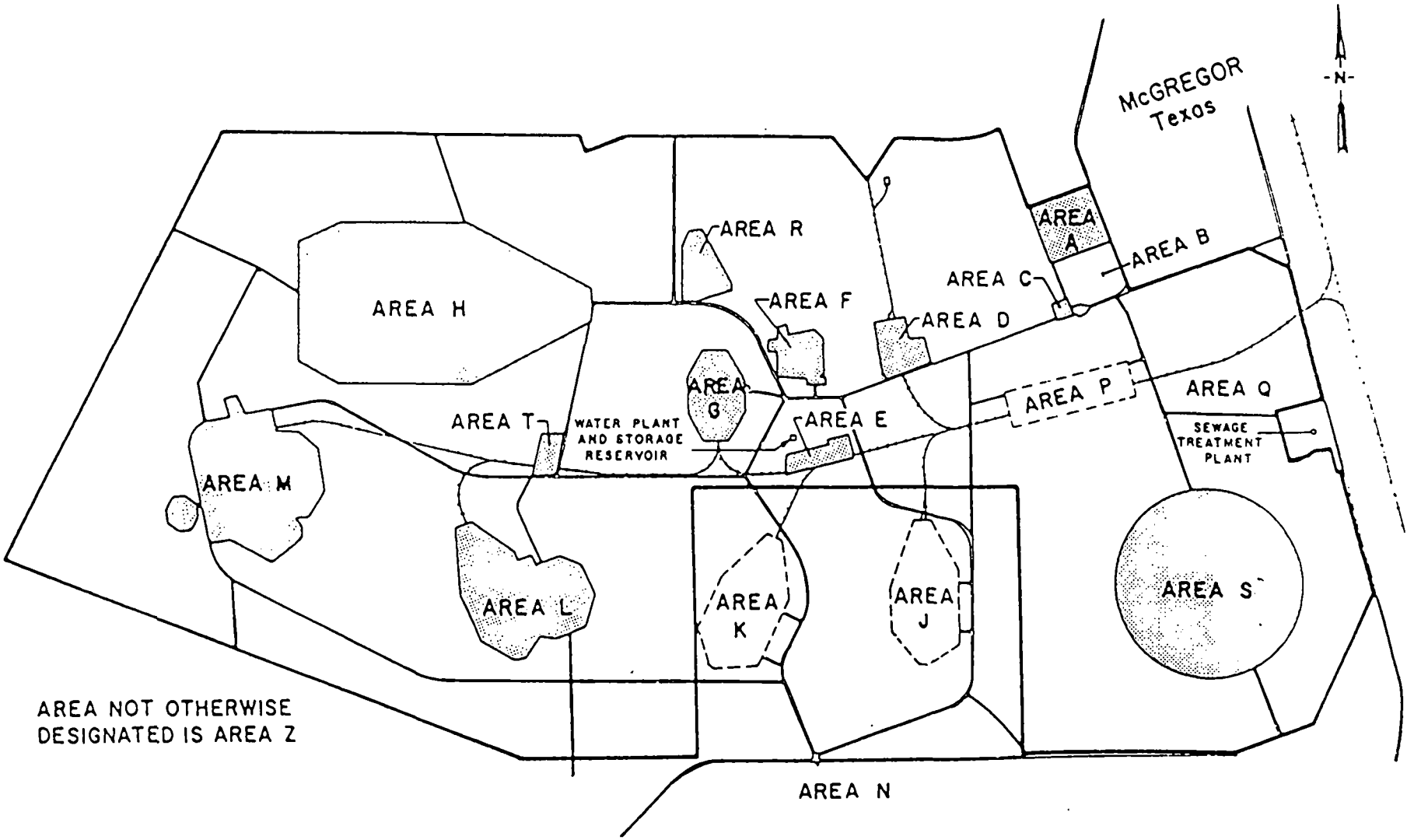

-N-
Scale 1" = 50'
Flume
Crest El 97 to 98
<6" TATB
Water level El 94
6" to 20" TATB
Crest El 97 to 98
Traces of TATB
Water level El 94
Top of sand bottom El 91
Crest El 96 to 97
Water level El 93.5
6" to 9" of TATB
Top of sand bottom El 91
<6" of TATB
Note: Elevation 100.00 assumed on bolt between Chattanooga and Tennessee at top of fire hydrant east of fence, adjacent to flume.
WEST IMPOUNDMENTS
SHANNON & WILSON, INC.
Geotechnical Consultants
J-104

PLATE 1

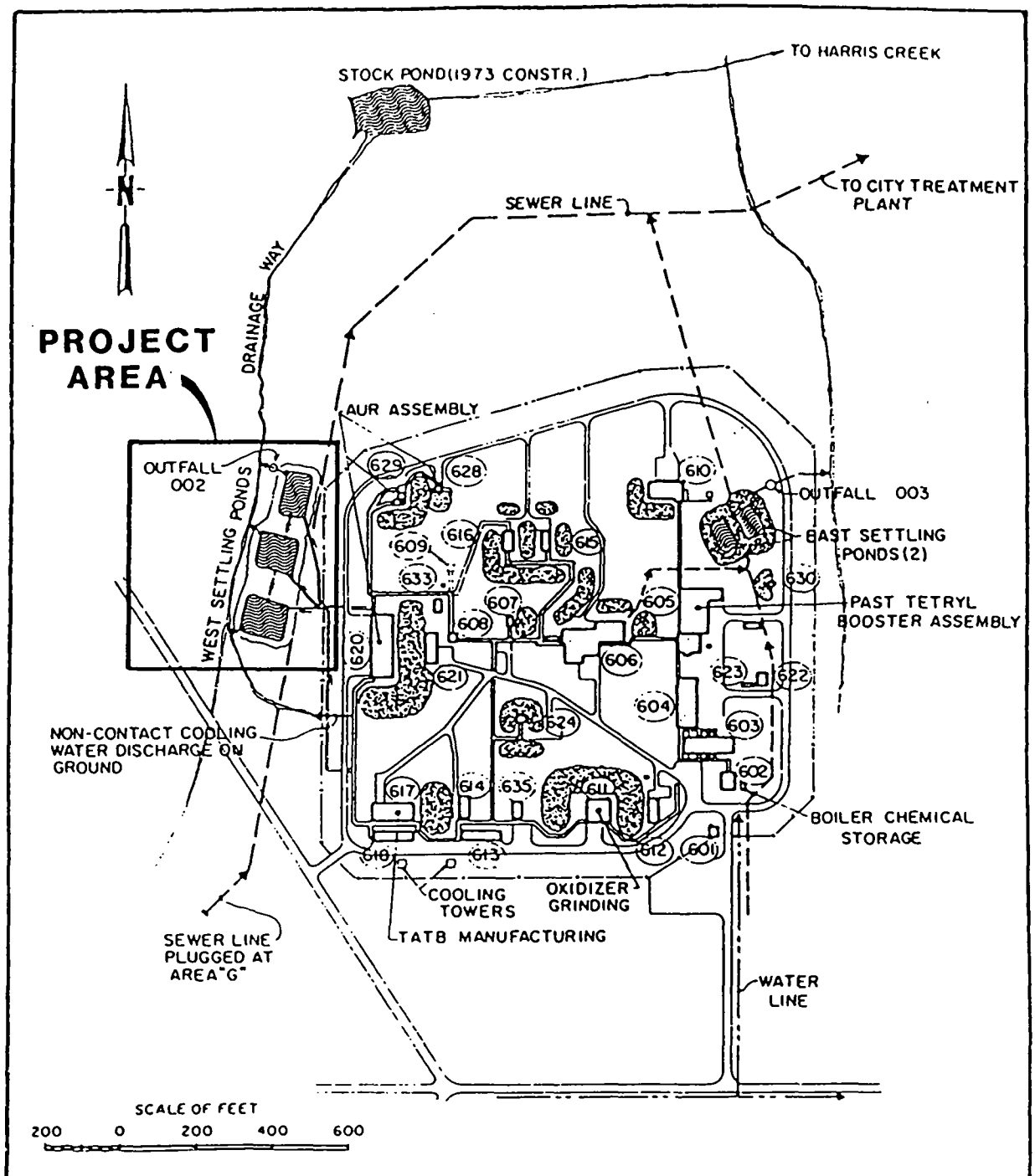


NOTE

THIS FIGURE OBTAINED FROM ENVIRODYNE ENGINEERS REPORT OF SEPTEMBER 1981

NWIRP- McGREGOR SITE LOCATION PLAN

PLATE 2



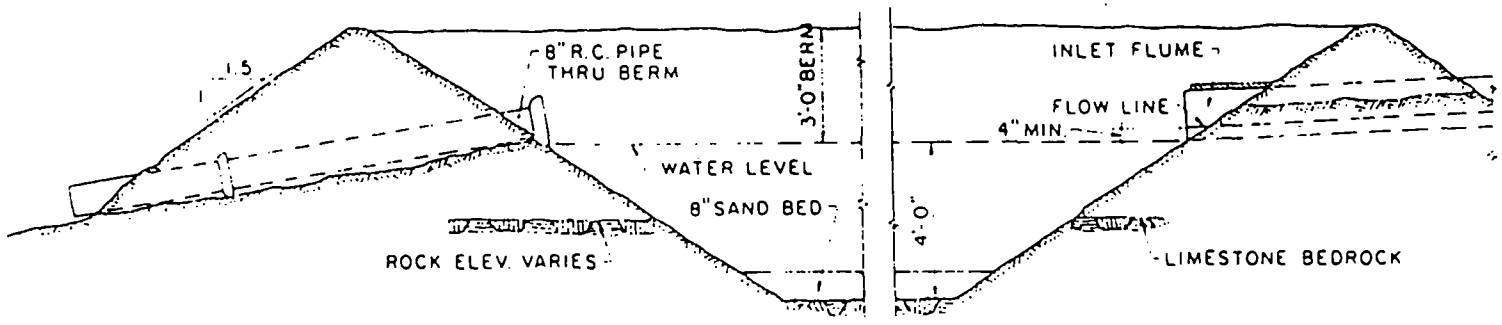
NOTE

THIS FIGURE OBTAINED FROM ENVIRODYNE ENGINEERS REPORT PREVIOUSLY REFERENCED.

AREA F

ENGINEERING LABORATORIES AND PILOT PRODUCTION

PLATE 3



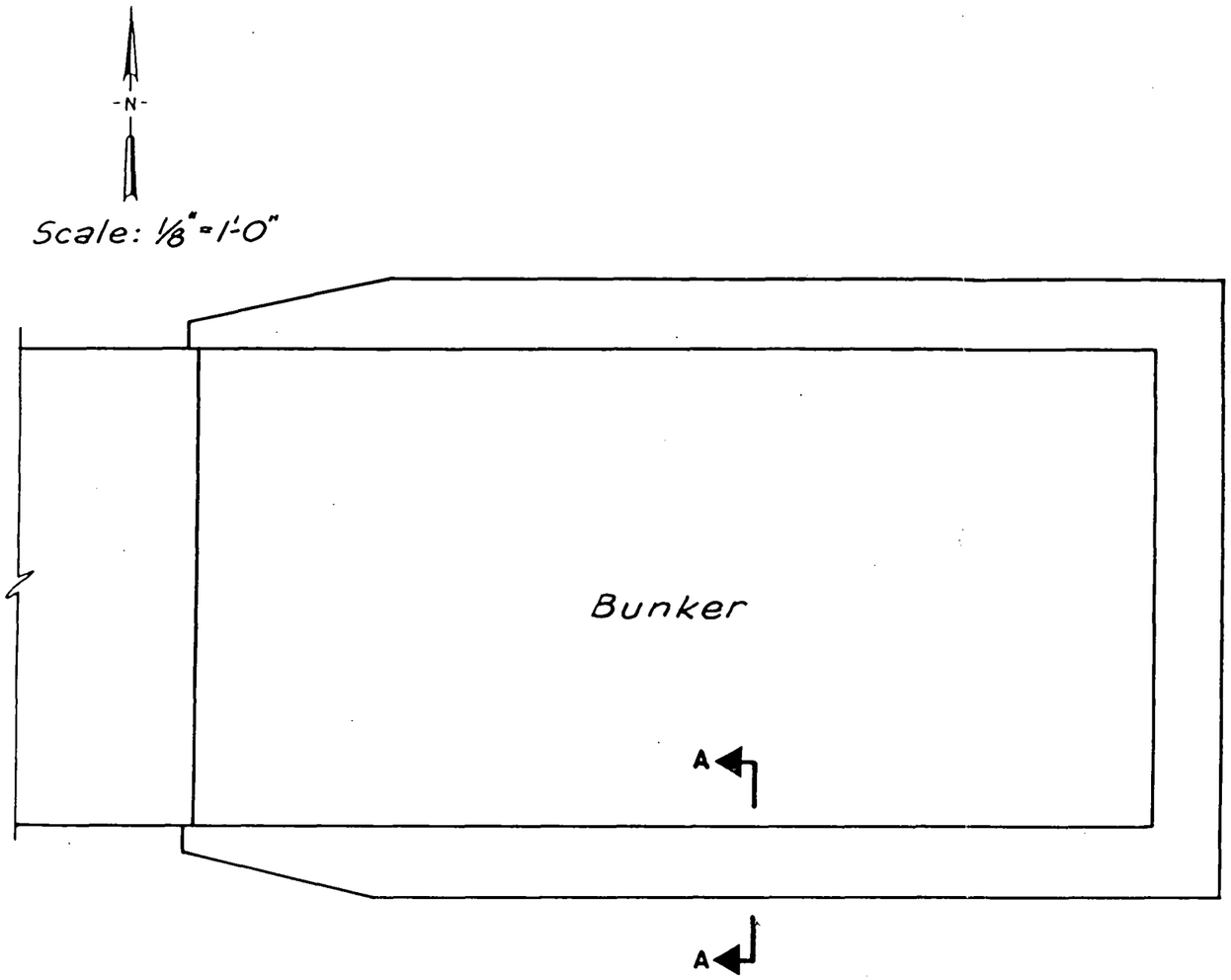
NOTE

THIS FIGURE OBTAINED FROM
ENVIRODYNE ENGINEERS REPORT
PREVIOUSLY REFERENCED

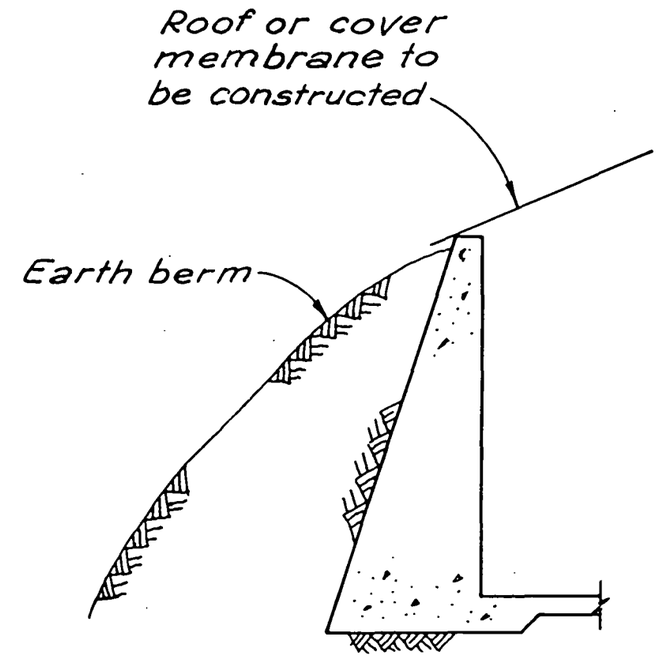
AREA F

TYPICAL SECTION THRU SETTLING PONDS

PLATE 4



PLAN



SECTION A-A

Scale: 1/4"=1'-0"

STORAGE BUNKER
PLAN AND SECTION

SHANNON & WILSON, INC.
Geotechnical Consultants

J-104

PLATE 5

APPENDIX A

Hercules, Inc. Closure Request

and

TDWR Closure Authorization

HERCULES

Hercules Incorporated
Hercules Aerospace Division
P. O. Box 548
McGregor, TX 76657
(817) 840-2011

October 25, 1982

In reply refer to 82HT1240

Texas Department of Water Resources
Post Office Box 13087
Capitol Station
Austin, Texas 78711

Attention: Ms. Ann McGinley

Subject: Closure request for hazardous waste surface impoundment
NWIRP-McGregor, Texas

Dear Ms. McGinley:

This document serves as formal written notice of a change in operating procedure for the hazardous waste surface impoundments at the Naval Weapons Industrial Reserve Plant, McGregor, Texas.

A temporary lull in our process will cause the flow of hazardous waste water from Area F to cease between December 1982 and May 1983. We would like to use this shut-down period to upgrade our waste treatment facilities predicated on the newly proposed EPA regulations for surface impoundments dated July 26, 1982.

A final decision has not been reached on the replacement facility for our settling ponds, but realizing that we must be operational in late April, time is a very important factor. With this in mind, we are hereby requesting permission to close our current facilities, west of Area F, beginning 90 days from this date of October 25, 1982. The attached plans outline the steps that will be taken to close the ponds and if approved, the closure should be completed in early February.

Within the next 45 days, we intend to submit a request for permit modification to cover the replacement facility. Your most expedient review is requested so that we might begin construction in February and operation in early May.

We believe it is within our best interest to control hazardous wastes effectively and we solicit your aid in improving our treatment facilities. Any questions or comments should be directed to the attention of Kathleen Anglin at 840-2811, Ext 1281.

Very truly yours,

W. H. Fuller
Vice President and
General Manager

WHF:vjm

cc: Ken Chacey
Naval Facilities Engineering Command
2114 Melbourne Street
Charleston, SC 29411

Doug Keilman
Hercules, Wilmington

Alan Messenger
Texas Department of Water Resources
Post Office Box 13087
Capitol Station
Austin, Texas 78711

Don Wyrick
Texas Department of Water Resources
3221 Franklin
Waco, Texas 76710

AMENDED CLOSURE PLANS FOR SURFACE IMPOUNDMENTS

A. Purpose

This plan establishes the steps that will be used to close the hazardous waste surface impoundments located west of Area F at the Naval Weapons Industrial Reserve Plant, McGregor, Texas. Each impoundment will be closed in accordance with Title 40, Code of Federal Regulations, Subpart G. 265.111, dated May 19, 1980.

B. References

1. Title 40, Code of Federal Regulations, May 19, 1980.
   Part G. 265.111, "Closure Performance Standard".
   Part G. 265.112, "Closure Plan, Amendment of Plan".
   Part K. 265.228, "Closure and post-closure - Surface Impoundments".

2. Texas Water Development Board, Industrial Solid Waste, Chapter 156.22.13.001-.010, "Closure and Post Closure".

C. Procedure

The plans for closing the 3 surface impoundments west of Building F-620 are as follows:

1. All flumes leading to these surface impoundments will be thoroughly washed with water to render them free of hazardous wastes.

2. The liquids contained in the ponds will be analyzed as required by NPDES permit #TX008307 for pH, COD, NH_3-N, and oil and grease content. If the liquids meet all permit requirements, they will be removed by pumping or draining the ponds. Should any suspended solids be contained within the liquid, these will be removed by filtration. This drainage will occur at a rate not to exceed the permit specifications of 40,000 gallons per day or a daily average of 20,000 gallons. Any liquid not meeting NPDES standards will be treated to meet the permit requirements and then remove by pumping or draining the ponds as noted above.

3. The waste material remaining in the ponds will be sampled and analyzed for ignitability, corrosivity, reactivity, and extraction procedure toxicity per 40 CFR 261, Subpart C. If the material exhibits any of these characteristics of a hazardous waste, all contaminated material will be removed and disposed of at an E.P.A. approved facility.

4. The interconnecting pond plumbing will be removed, washed, and stored for possible future use.

D. Closure Schedule

The dates listed herein are target times for completion of the surface impoundment closures. These dates are subject to mutually agreeable changes and may be amended by facility petition and written confirmation from the Texas Department of Water Resources.

1. This amended closure is being submitted as October 25, 1982 and complies with all closure requirements as outlined in Title 40 CFR, dated May 19, 1980. This closure is also in compliance with the rules of the Texas Water Development Board pertaining to industrial solid waste management.

2. It is expected that TDWR will modify, approve, or disapprove this plan within 90 days of receipt as specified in Subpart G.265.112(c) of Title 40 CFR. This scheduled date will be January 23, 1983.

3. It is expected that no hazardous wastes will be received into these ponds after December 1, 1982.

4. All hazardous wastes now at the affected locations will be treated and removed within 90 days of final hazardous waste receipt. This should occur no later than March 1, 1983.

5. Closure activities will be completed within 6 months of final hazardous waste receipt. The expected final closure date will be no later than June 1, 1983.

E. Estimate of Maximum Waste Inventory (The following is for information purposes only.)

It is estimated that a maximum of approximately 500,000 gallons of waste water have been treated or stored in Area F settling ponds at any given time. The quantities of waste in the ponds will be significantly less when closure proceedings begin.

TEXAS DEPARTMENT OF WATER RESOURCES
1700 N. Congress Avenue
Austin, Texas

TEXAS WATER DEVELOPMENT BOARD
Louis A. Beecherl, Jr., Chairman
George W. McCleskey, Vice Chairman
Glen E. Roney
W. O. Bankston
Lonnie A. "Bo" Pilgrim
Louie Welch

Harvey Davis
Executive Director

TEXAS WATER COMMISSION
Lee B. M. Biggart, Chairman
Felix McDonald
John D. Stover

November 23, 1982

Mr. W. H. Fuller
Hercules Incorporated
Hercules Aerospace Division
P. O. Box 548
McGregor, Texas 76657

Dear Mr. Fuller:

Re: Solid Waste Registration No. 30056
Hercules Reference No. 82HT1240

This letter is in response to your letter of October 25, 1982 and a meeting held November 10, 1982 between representatives of Hercules, Inc. and Texas Department of Water Resources (TDWR). The Department staff has reviewed the closure plan submitted for three surface impoundments west of Building F-620 and feels that this proposal satisfies the requirements of Subchapters A, J and N of the Industrial Solid Waste Rules pertaining to waste facility closure. This letter authorizes Hercules, Inc. to initiate closure activities for the surface impoundments.

At the project's completion, TDWR requests that Hercules, Inc. obtain certification from a professional engineer that the impoundment closure has been performed according to the specifications of your closure plan. In addition, we also request that you provide this agency with copies of the pond bottom analysis in order to demonstrate that the hazardous wastes have been removed.

We ask that you contact our TDWR District 3 Office in Waco at 817/753-3688 at least one week prior to the excavation of the impoundment bottoms so that they will have an opportunity to observe your work. Should you have any questions about this matter, contact Ms. Ann McGinley of our Solid Waste Compliance Unit at 512/475-5516.

Sincerely yours,

Harvey Davis for
Executive Director

ccs: Mr. Greg Tipple, Permits Division
Texas Department of Water Resources District 3 Office

APPENDIX II

REVISED CLOSURE PLAN THREE
HAZARDOUS WASTE SURFACE IMPOUNDMENTS
NWIRP-McGREGOR, TEXAS

CONSULTANTS
William L. Shannon, P.E.
Stanley D. Wilson, P.E.

SHANNON & WILSON, INC.
Geotechnical Consultants
Suite 276 • 11500 Olive Boulevard • St. Louis, Missouri 63141-7126 • Telephone (314) 872-8170

June 21, 1983 J-104-02

Texas Department of Water Resources
P.O. Box 13087
Capitol Station
Austin, Texas 78711

Attention: Ms. Ann McGinley

RE: Revised Closure Plan
Three Hazardous Waste Surface Impoundments
NWIRP-McGregor Texas

Dear Ms. McGinley:

Submitted herewith is a revised closure plan for three surface impoundments located west of Area F at the Naval Weapons Industrial Reserve Plant (NWIRP) near McGregor, Texas. This plan supersedes our closure plan of January 18, 1983 and our proposed alternate of March 22, 1983 and is necessary because of field conditions encountered. However, the plan is in general agreement with the closure plan submitted by Hercules Inc. to Texas Department of Water Resources (TDWR) on October 25, 1982. The initial closure request is given in Appendix A. Closure was authorized by Mr. Henry Davis, Executive Director of TDWR by correspondence of November 23, 1982, also included in Appendix A.

As proposed by our previous submittals, a phased approach is being used for impoundment closure. However, in this case, a six phase rather than a seven phase program is planned. Site conditions are forcing removal of all material from an impound-

ment at one time rather then selective excavation. As a result, all the impoundment waste and underlying sand liner is being transported to Area S pending final disposition. This eliminated Phase V of the previous program.

Introduction

Since the impoundments received waste water from process and washdown operations from the manufacture of triamino trinitro benzene (TATB), a Class A explosive, the waste sludge is considered a hazardous waste from a specific source under 40CFR Part 261.32. The waste has a KO44 designation which is source specific because of potential reactivity.

Since only minor amounts of TATB were visually evident in the north and middle impoundments, it was thought that the TATB contamination could be removed by a combination of selective mechanical and hand excavation. This process was started in January 1983. However, after accomplishing some of the hand excavation in the north impoundment, it was evident that presence of TATB in the top stratum of sediment is more common than previously believed. Also, some contamination of the underlying sand liner was observed. Therefore, our closure plan is being amended to reflect these conditions. A six phase program has been developed. The phases are:

I. Decontamination of flumes and removal and decontamination of impoundment piping;

II. Removal of impoundment waste water;

III. Removal and disposal of waste TATB and underlying sand liner;

IV. Sampling of disposed sand liner and sediment waste, and testing for reactivity;

V. Backfilling of the impoundments; and,

VI. Sampling and testing of burned waste.

Phase I - Piping and Flume Decontamination

All flumes have been washed with water to remove hazardous wastes which may have settled in the flumes.

The piping which interconnects the impoundments will be removed during Phase IV operations. The piping will be decontaminated by washing and stored for future use.

Phase II - Wastewater Removal

Wastewater within the ponds was analyzed for pH, COD, NH_3-N, and oil and grease content to determine if it met requirements of NPDES permit #TX0034321. Since the testing indicated the water met permit requirements, it was removed to the extent possible by pumping and discharged to the adjacent drainage swale. The drainage was accomplished at a rate which did not exceed the permit specifications of 40,000 gallons per day or an average of 20,000 gallons per day. Wastewater containing suspended solids was not discharged from the impoundments.

Pumping removed most of the water except that which ponded in low areas or contained suspended solids. This remaining water plus water which accumulates in the impoundments because of rain will be removed during Phase III. At that time water from the north and south impoundments will be pumped to the middle impoundment. The middle impoundment will be treated last during Phase III work. The water in the middle impoundment will be discharged to the adjacent drainage swale if it meets NPDES permit standards. Suspended solids, if any, will be removed by filtration. As an alternative, water may be pumped to a filtration system from each impoundment individually. A schematic diagram of the impoundments is given on Plate 1.

Phase III - Excavation and Disposal of Impoundment Materials

The excavation and disposal of impoundment materials is being accomplished by the facility contractor, Hercules Inc.

Day-to-day activities and project safety are the responsibility of Hercules Inc.

Excavation - Excavation is being accomplished with a rubber tired front end loader. The excavated material is being hauled from the site by dump truck to the Area S burn pit where it will be burned or otherwise processed as discussed in a subsequent section. A site plan showing Area F and Area S is given on Plate 2. The location of the impoundments is shown on Plate 3.

The material from the north and middle impoundments is being removed in two layers. First, the end loader excavates the top layer of sediment by skimming the top of the underlying sand liner in an area about 20 feet long and the width of the impoundment. The material is dumped into trucks and transported to Area S. Secondly, the sand liner is excavated from the working area to the top of clay or rock, whichever is encountered. The sand is also hauled to Area S. This process is repeated as necessary until an impoundment is excavated.

Because of the extent of contamination in the south impoundment, the TATB and sand will probably be removed as one layer.

Spillage and contamination during the removal process is controlled by lining the bed of the dump trucks with polyethylene sheeting. The exteriors of the trucks are washed prior to leaving the impoundments or Area S burn pit if exterior contamination occurs.

Disposal - The excavated materials are end-dumped on the west side of the Area S burn pit in three areas. The top layer of sediment and the underlying sand from the northernmost impoundments are each deposited in a seperate area, and the remaining area will contain the south impoundment waste. Deposit height is limited by the angle of repose of the

material. The south impoundment materials and other which prove to be hazardous will be periodically burned. The time interval and quantity will be determined by a trial process. It may be burned in a pile or may be spread and allowed to air-dry. The actual process will depend on results of trial burns. If necessary, the sludge may be mixed with a petroleum product, such as Number 2 fuel oil or waste TATB product, to initiate and/or sustain burning. The Texas Air Board has been contacted and is permitting open burning of this material.

Area S is listed as an open-burn area for propellant and organic processing material in the Texas Department of Water Resources Permit Application for Industrial Solid Waste Storage/Processing Disposal Facility, Part A - Facility Background Information submitted to TDWR by Hercules Inc. The facility has EPA, TSD Facility Number TXD000453399 and TDWR generator registration Number 30056.

Post-Removal Cleanup - At the conclusion of TATB sludge removal, the end loader and dump truck units will be washed with water within the Area S burn pit. The end loader bucket and dump truck beds will be flame tested prior to removal from NWIRP.

Phase IV - Testing for Reactivity

The presence of one percent or more TATB can be determined by infrared scan. However, it has not been determined whether this concentration of TATB is reactive. Therefore, a testing program will be undertaken in conjunction with the U.S. Bureau of Mines and a private laboratory, to determine the reactivity of different concentrations of TATB mixed with soil. One, seven, and fifteen percent concentrations will be tested. Other concentrations may be tested depending on data from the initial three tests. The Bureau of Mines has a contract with USEPA to perform that agency's explosivity testing and has

developed specific test procedures approved by USEPA. Non-explosive test requirements will be performed by a private laboratory. Infrared scans will also be performed by the facility contractor so as to have a base record for the indicated concentration.

In conjunction with the above program, samples will be taken of the disposed materials in Area S from the north and middle impoundments. Infrared scans will be made on the samples and if the sample contains less TATB than that indicated to be the threshold of reactivity (based on Bureau of Mines tests) and if the sample has a negative reaction to an impact sensitivity test, the sample will be considered nonreactive.

Also, leachate tests will be performed in accordance with Texas Department of Water Resource guidelines[2]. The filtered material will be tested for total organic carbon, ammonia, chromium, lead, cadmium arsenic, mercury, selinium, and silver. Background samples of the soil adjacent to the impoundments will also be tested to establish background levels.

A sampling and analysis plan giving sampling techniques and other pertinent data, including testing methods, is attached as Appendix B. Sampling will be performed in general accordance with published EPA guidelines.[1] The number of samples will be determined in the field in conjunction with a TDWR representative.

The Region III office of TDWR will be notified in advance of sampling so that a department representative can be present, if desired.

---

[1]"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Published by the U.S. Environmental Protection Agency; Publication SW-846; 2nd Edition, 1982.

[2]"Texas Department of Water Resources Industrial Solid Waste Management Technical Guide No. 1", Texas Department of Water Resources, Issue 5376, Revised 5/11/83.

The materials will be reclassified by TSWR based on test data.

Phase VI - Backfilling

After the material has been removed, the clay and/or rock base of the excavation will be examined in conjunction with a representative from TDWR Region III office. Additional testing may be performed if necessary. After it is determined that the site is clean, backfilling will commence. On-site adjacent soils which are of the Denton Clay and San Saba Clay Soil Series will be used for backfill. These soils typically have a clay content ranging between 35 and 60 percent and contain limestone gravel and cobbles. The backfill will be graded so as to slope downward to the northwest. The impoundment berms will be breached to allow rapid drainage. Runoff other than that which falls within the limits of the impoundment will be diverted. The backfill will be placed in thin lifts (6 to 8 inches) and the soil compacted with at least four passes of the earth moving equipment. The groundwater monitoring wells will be filled with grout.

Phase VII - Burned Waste

Treated waste will be tested after burning by infrared scans and leachate tests to determine the classification of the waste. TDWR representatives will be notified concerning sampling methods and results of tests at a latter date.

* * * * * *

We appreciate the cooperation you have provided on behalf of Texas Department of Water Resources. Please contact me if you have any questions or comments.

Very truly yours,

SHANNON & WILSON, INC.

Ronald M. Eckelkamp, P.E.
Principal Engineer

RME:jw

cc: Mr. Don Wyrick
Mr. Ken Chacey
Ms. Kathleen Anglin

Attachments:

Plate 1	West Impoundments
Plate 2	NWIRP-McGregor Site Location Plan
Plate 3	Area F Engineering Laboratories and Pilot Production
Plate 4	Area F Typical Section Through Settling Ponds
Appendix A	- Hercules Inc. Closure Request and TDWR Closure Authorization
Appendix B	Sampling and Analyses Plan, Three Hazardous Waste Impoundments, NWIRP-McGregor, Texas

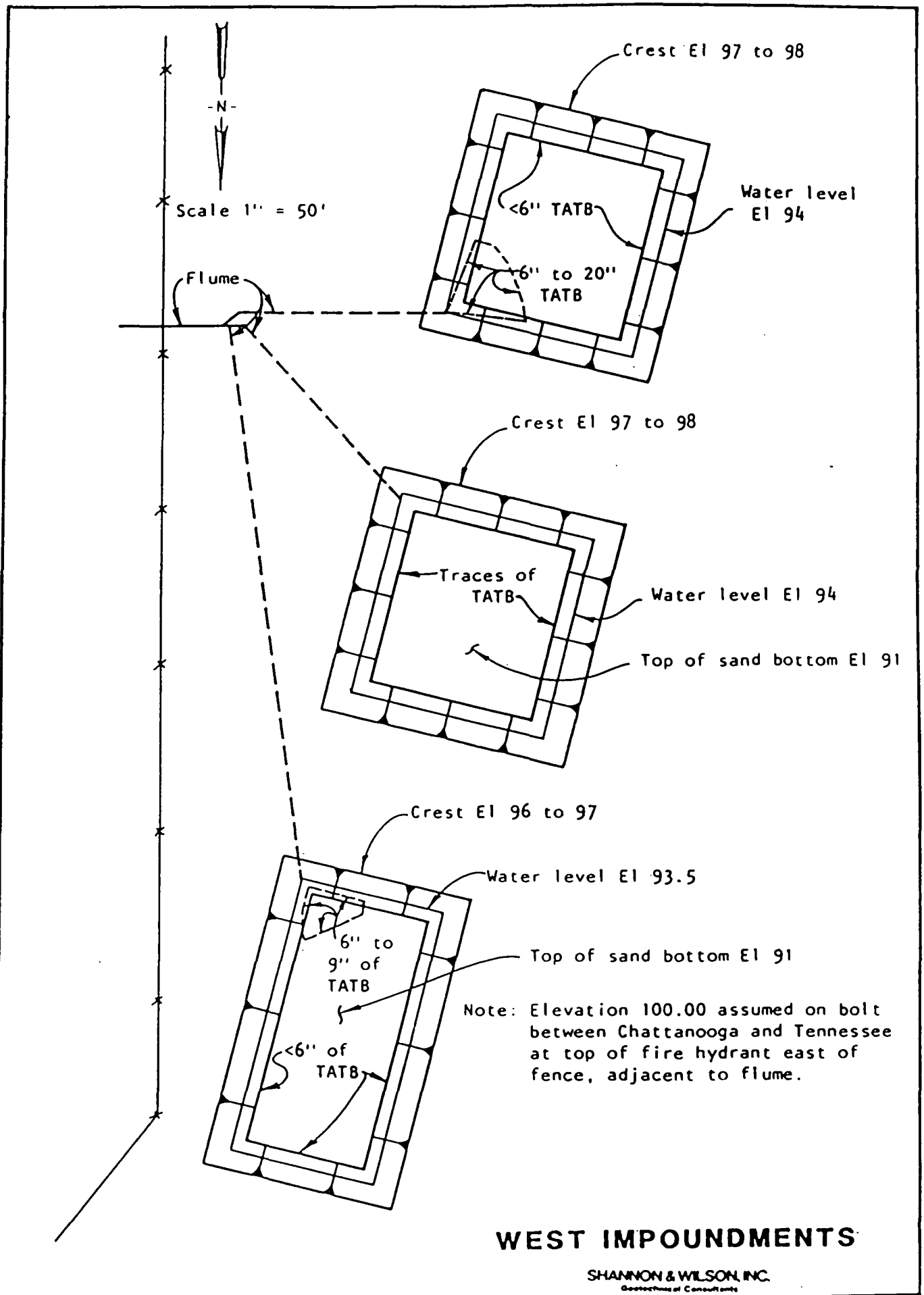
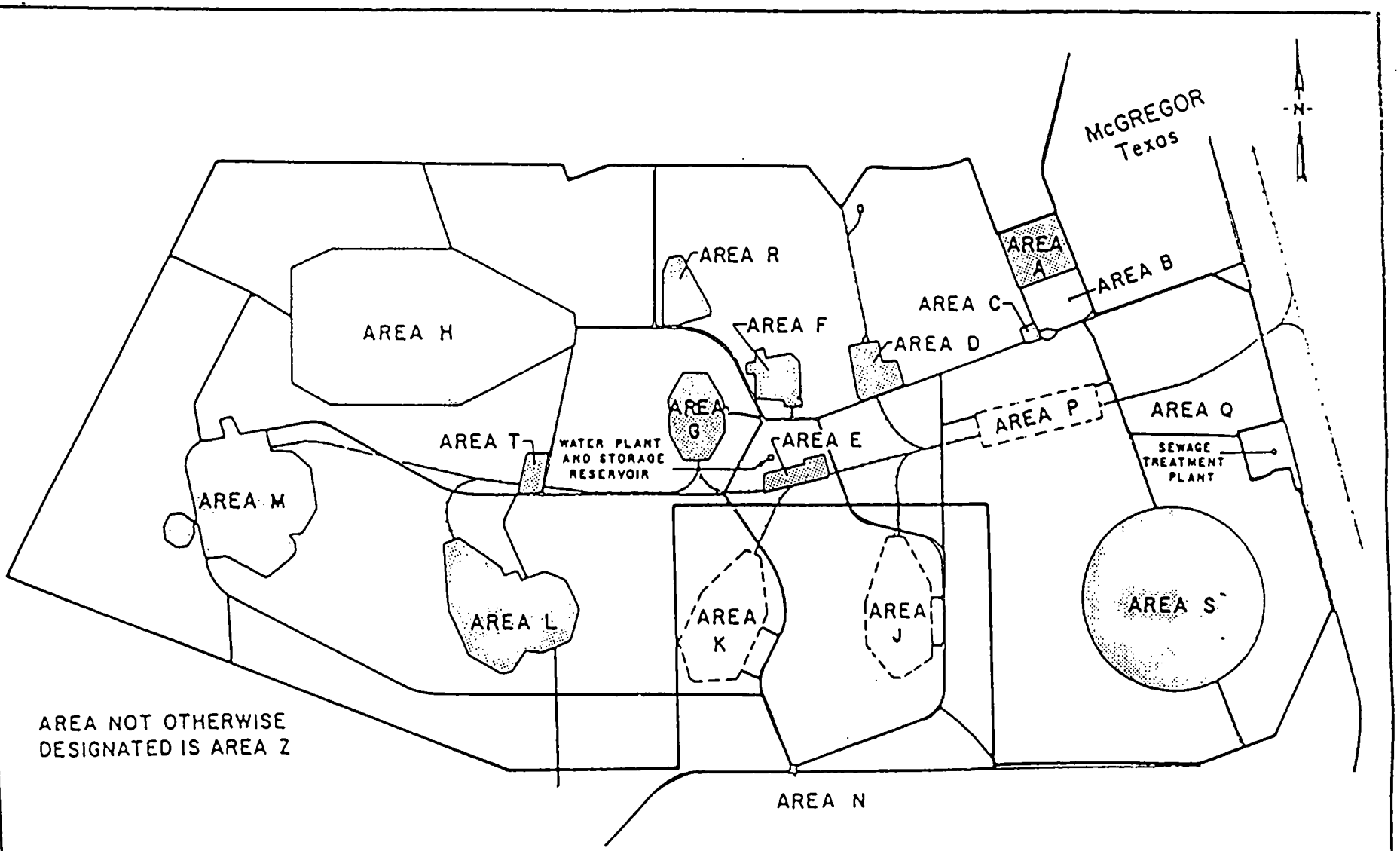

-N-
Scale 1" = 50'
Flume
Crest El 97 to 98
<6" TATB
6" to 20" TATB
Water level El 94
Crest El 97 to 98
Traces of TATB
Water level El 94
Top of sand bottom El 91
Crest El 96 to 97
Water level El 93.5
6" to 9" of TATB
Top of sand bottom El 91
<6" of TATB
Note: Elevation 100.00 assumed on bolt between Chattanooga and Tennessee at top of fire hydrant east of fence, adjacent to flume.
WEST IMPOUNDMENTS
SHANNON & WILSON, INC.
J-104

PLATE 1

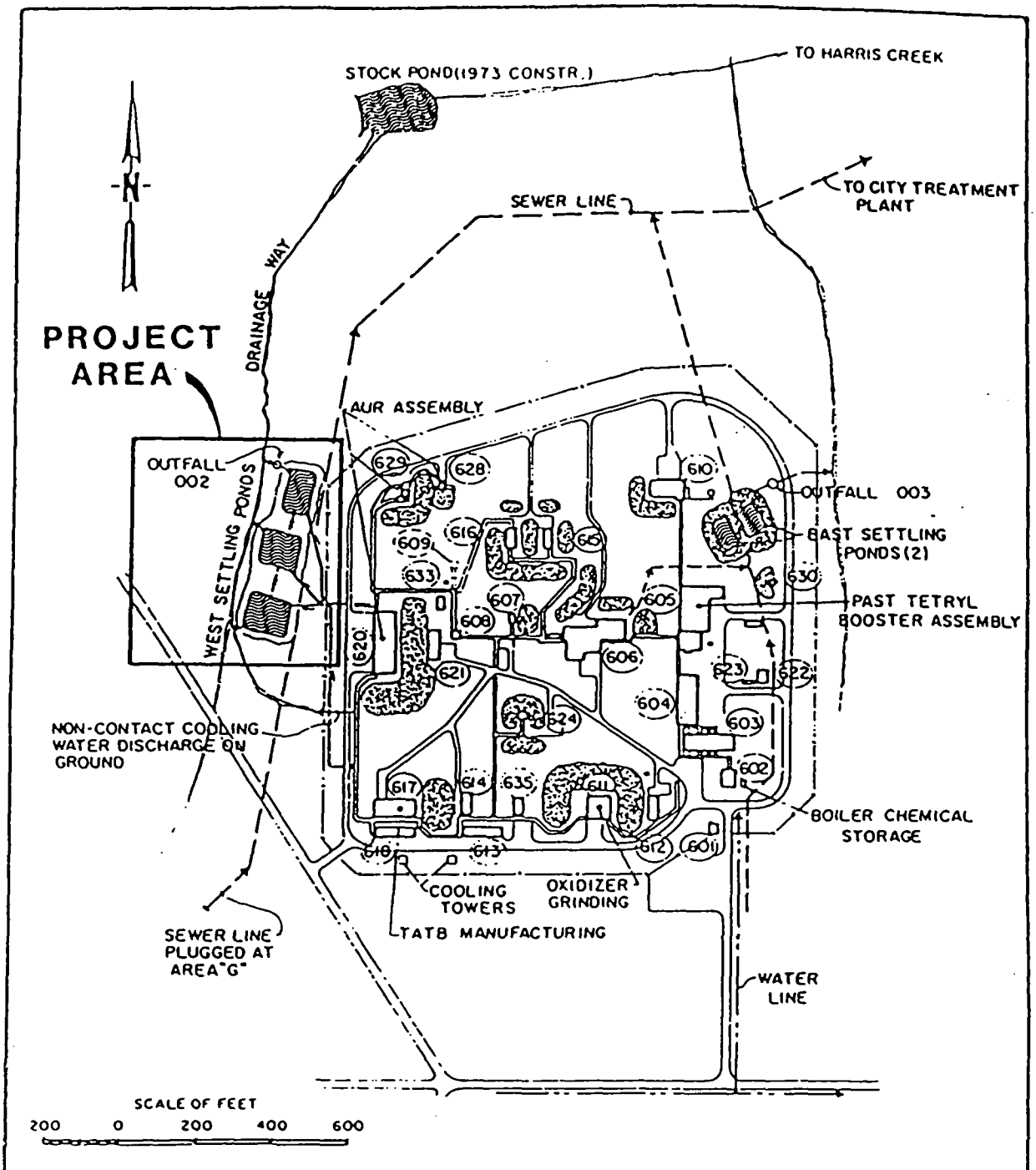


NOTE

THIS FIGURE OBTAINED FROM ENVIRODYNE ENGINEERS REPORT OF SEPTEMBER 1981

NWIRP- McGREGOR SITE LOCATION PLAN

PLATE 2



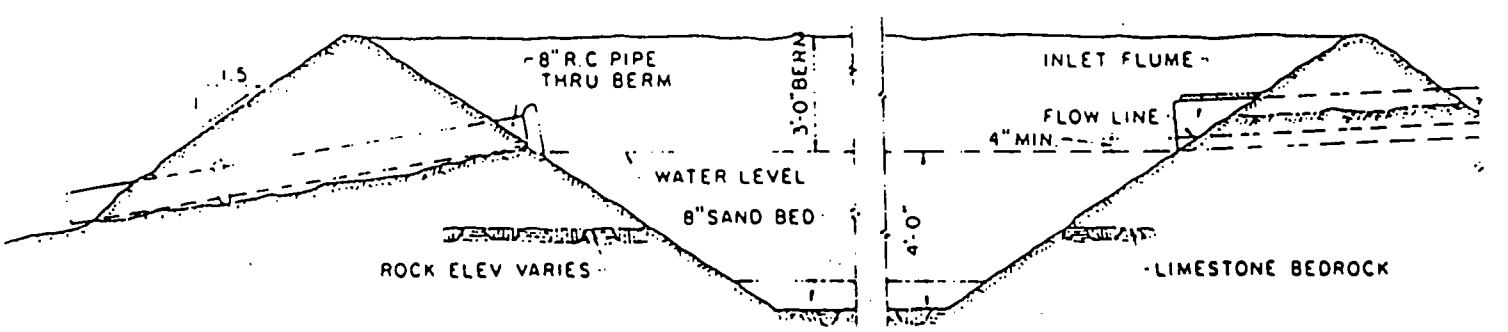
NOTE

THIS FIGURE OBTAINED FROM ENVIRODYNE ENGINEERS REPORT PREVIOUSLY REFERENCED.

AREA F

ENGINEERING LABORATORIES AND PILOT PRODUCTION

PLATE 3



NOTE

THIS FIGURE OBTAINED FROM ENVIRODYNE ENGINEERS REPORT PREVIOUSLY REFERENCED

AREA F

TYPICAL SECTION THRU SETTLING PONDS

PLATE 4

APPENDIX A

Hercules, Inc. Closure Request

and

TDWR Closure Authorization

HERCULES

Hercules Incorporated
Hercules Aerospace Division
P. O. Box 548
McGregor, TX 76657
(817) 840-2011

October 25, 1982

In reply refer to 82HT1240

Texas Department of Water Resources
Post Office Box 13087
Capitol Station
Austin, Texas 78711

Attention: Ms. Ann McGinley

Subject: Closure request for hazardous waste surface impoundment
NWIRP-McGregor, Texas

Dear Ms. McGinley:

This document serves as formal written notice of a change in operating procedure for the hazardous waste surface impoundments at the Naval Weapons Industrial Reserve Plant, McGregor, Texas.

A temporary lull in our process will cause the flow of hazardous waste water from Area F to cease between December 1982 and May 1983. We would like to use this shut-down period to upgrade our waste treatment facilities predicated on the newly proposed EPA regulations for surface impoundments dated July 26, 1982.

A final decision has not been reached on the replacement facility for our settling ponds, but realizing that we must be operational in late April, time is a very important factor. With this in mind, we are hereby requesting permission to close our current facilities, west of Area F, beginning 90 days from this date of October 25, 1982. The attached plans outline the steps that will be taken to close the ponds and if approved, the closure should be completed in early February.

Within the next 45 days, we intend to submit a request for permit modification to cover the replacement facility. Your most expedient review is requested so that we might begin construction in February and operation in early May.

We believe it is within our best interest to control hazardous wastes effectively and we solicit your aid in improving our treatment facilities. Any questions or comments should be directed to the attention of Kathleen Anglin at 840-2811, Ext 1281.

Very truly yours,

W. H. Fuller
Vice President and
General Manager

WHF:vjm

cc: Ken Chacey
Naval Facilities Engineering Command
2114 Melbourne Street
Charleston, SC 29411

Doug Keilman
Hercules, Wilmington

Alan Messenger
Texas Department of Water Resources
Post Office Box 13087
Capitol Station
Austin, Texas 78711

Don Wyrick
Texas Department of Water Resources
3221 Franklin
Waco, Texas 76710

AMENDED CLOSURE PLANS FOR SURFACE IMPOUNDMENTS

A. Purpose

This plan establishes the steps that will be used to close the hazardous waste surface impoundments located west of Area F at the Naval Weapons Industrial Reserve Plant, McGregor, Texas. Each impoundment will be closed in accordance with Title 40, Code of Federal Regulations, Subpart G. 265.111, dated May 19, 1980.

B. References

1. Title 40, Code of Federal Regulations, May 19, 1980.
   Part G. 265.111, "Closure Performance Standard".
   Part G. 265.112, "Closure Plan, Amendment of Plan".
   Part K. 265.228, "Closure and post-closure - Surface Impoundments".

2. Texas Water Development Board, Industrial Solid Waste, Chapter 156.22.13.001-.010, "Closure and Post Closure".

C. Procedure

The plans for closing the 3 surface impoundments west of Building F-620 are as follows:

1. All flumes leading to these surface impoundments will be thoroughly washed with water to render them free of hazardous wastes.

2. The liquids contained in the ponds will be analyzed as required by NPDES permit #TX008307 for pH, COD, NH_3-N, and oil and grease content. If the liquids meet all permit requirements, they will be removed by pumping or draining the ponds. Should any suspended solids be contained within the liquid, these will be removed by filtration. This drainage will occur at a rate not to exceed the permit specifications of 40,000 gallons per day or a daily average of 20,000 gallons. Any liquid not meeting NPDES standards will be treated to meet the permit requirements and then remove by pumping or draining the ponds as noted above.

3. The waste material remaining in the ponds will be sampled and analyzed for ignitability, corrosivity, reactivity, and extraction procedure toxicity per 40 CFR 261, Subpart C. If the material exhibits any of these characteristics of a hazardous waste, all contaminated material will be removed and disposed of at an E.P.A. approved facility.

4. The interconnecting pond plumbing will be removed, washed, and stored for possible future use.

D. Closure Schedule

The dates listed herein are target times for completion of the surface impoundment closures. These dates are subject to mutually agreeable changes and may be amended by facility petition and written confirmation from the Texas Department of Water Resources.

1. This amended closure is being submitted as October 25, 1982 and complies with all closure requirements as outlined in Title 40 CFR, dated May 19, 1980. This closure is also in compliance with the rules of the Texas Water Development Board pertaining to industrial solid waste management.

2. It is expected that TDWR will modify, approve, or disapprove this plan within 90 days of receipt as specified in Subpart G.265.112(c) of Title 40 CFR. This scheduled date will be January 23, 1983.

3. It is expected that no hazardous wastes will be received into these ponds after December 1, 1982.

4. All hazardous wastes now at the affected locations will be treated and removed within 90 days of final hazardous waste receipt. This should occur no later than March 1, 1983.

5. Closure activities will be completed within 6 months of final hazardous waste receipt. The expected final closure date will be no later than June 1, 1983.

E. Estimate of Maximum Waste Inventory (The following is for information purposes only.)

It is estimated that a maximum of approximately 500,000 gallons of waste water have been treated or stored in Area F settling ponds at any given time. The quantities of waste in the ponds will be significantly less when closure proceedings begin.

TEXAS DEPARTMENT OF WATER RESOURCES
1700 N. Congress Avenue
Austin, Texas

TEXAS WATER DEVELOPMENT BOARD
Louis A. Beecherl, Jr., Chairman
George W. McCleskey, Vice Chairman
Glen E. Roney
W. O. Bankston
Lonnie A. "Bo" Pilgrim
Louie Welch

Harvey Davis
Executive Director

TEXAS WATER COMMISSION
Lee B. M. Biggart, Chairman
Felix McDonald
John D. Stover

November 23, 1982

Mr. W. H. Fuller
Hercules Incorporated
Hercules Aerospace Division
P. O. Box 548
McGregor, Texas 76657

Dear Mr. Fuller:

Re: Solid Waste Registration No. 30056
Hercules Reference No. 82HT1240

This letter is in response to your letter of October 25, 1982 and a meeting held November 10, 1982 between representatives of Hercules, Inc. and Texas Department of Water Resources (TDWR). The Department staff has reviewed the closure plan submitted for three surface impoundments west of Building F-620 and feels that this proposal satisfies the requirements of Subchapters A, J and N of the Industrial Solid Waste Rules pertaining to waste facility closure. This letter authorizes Hercules, Inc. to initiate closure activities for the surface impoundments.

At the project's completion, TDWR requests that Hercules, Inc. obtain certification from a professional engineer that the impoundment closure has been performed according to the specifications of your closure plan. In addition, we also request that you provide this agency with copies of the pond bottom analysis in order to demonstrate that the hazardous wastes have been removed.

We ask that you contact our TDWR District 3 Office in Waco at 817/753-3688 at least one week prior to the excavation of the impoundment bottoms so that they will have an opportunity to observe your work. Should you have any questions about this matter, contact Ms. Ann McGinley of our Solid Waste Compliance Unit at 512/475-5516.

Sincerely yours,

Harvey Davis
Executive Director

ccs: Mr. Greg Tipple, Permits Division
Texas Department of Water Resources District 3 Office

APPENDIX B

SAMPLING AND ANALYSIS PLAN

THREE HAZARDOUS WASTE SURFACE IMPOUNDMENTS

NWIRP - McGREGOR, TEXAS

INTRODUCTION

Potential reactivity of the materials will be based on sample collection procedures and methods of analysis given herein. Also, samples of materials treated in Area S will be collected and tested to determine their reactivity. Details concerning impoundment construction are given in a previous report.[1] Closure methods are given in the preceding report. The following sections give information concerning the following:

- o sampling locations,
- o sampling methods,
- o testing protocol and analytical procedures,
- o sample preservation,
- o sample shipment, and
- o chain of custody control.

SAMPLE LOCATION AND COLLECTION

Sampling will be accomplished by Shannon & Wilson, Inc. and Hercules, Inc. personnel. Containers will be marked, labeled, and shipped in accordance with chain of custody control procedures as given in a subsequent section.

Reactivity Tests

Tests for reactivity will be made on samples of soil obtained from near the surface impoundments mixed with a known amount of TATB. The material will be air-dried, weighed, and the required percent of TATB added. Approximately one pound of material will be placed in a 500-ml polyethylene bottle for shipment to analytical laboratories in Charleston, South Carolina. Also, approximately 100 pounds will be collected and

shipped to the U.S. Bureau of Mines in Pittsburgh, Pennsylvania. Testing responsibilities of each laboratory are given in subsequent sections.

Area S Waste Tests

The number of samples from wastes in Area S will depend on the volume of waste and will be determined in the field in conjunction with a representative of District III of the Texas Department of Water Resources. The samples will be tested by infrared scanning and leachate tests as discussed in a subsequent section. Chain of custody control procedures will also be used.

CHAIN OF CUSTODY CONTROL

Samples will be subject to chain of custody control. This will include sample seals and labels, a field log book, chain of custody records, and sample analysis request sheets. Documentation will be suitable to trace possession and handling of samples from the time of collection through analyses and final disposition. These items are discussed in the following paragraphs.

Field Log Book

All information pertinent to field sampling will be recorded in a log book which will be a bound 8-1/2 by 11 inch journal. The log book, as a minimum, will include the following:

- o purpose of sampling
- o location of sampling point
- o name and address of field contact
- o producer of waste and address

ANALYTICAL PROCEDURES

Tests will be made to determine: the concentration of TATB which makes the soil reactive; the concentration of TATB in the waste; and, concentration of other materials which may affect reclassifcation of the waste.

Reactivity Tests

Analytical tests will be conducted to determine if soil sediment mixed with one, seven, and fifteen percent TATB possesses the characteristics of reactivity. Specifically, tests will address characteristics given in Part 261.23 of the Resource Conservation Recovery Act shown herein on Plate B-3.

General Analytical Laboratory in Charleston, South Carolina will analyze samples for the first five items, including stability in air and water, gas generation, and whether it will generate cyanide or sulfide bearing gas when exposed to pH conditions between 2 and 12.5. Testing will be in accordance with established EPA guidelines.

Explosivity testing, the remaining three items of Part 261.23, will be conducted by the U.S. Bureau of Mines in Pittsburgh, Pennsylvania. Testing procedures will be those developed by the U.S. Bureau of Mines through an open-end contract with the USEPA to determine the explosivity of various materials. The testing basically consists of a two phase program, one of which subjects the waste to several ignitor forces and the other which subjects the waste to a strong shock. Any reaction to either one of these tests will deem it to be explosive.

Infrared Scans

TATB is insoluble in water, therefore GC/MS scanning methods cannot be used to detect TATB. Rather, infrared scanning is appropriate.

- o type of process producing waste
- o type of waste
- o suspected waste composition
- o number and volume of samples taken
- o description of sampling point and sampling methodology
- o date and time of sampling
- o references such as maps or photographs of sampling site
- o any field observations made
- o signatures of personnel responsible for observations

Chain of Custody Record

Chain of custody records will be completed and will accompany every sample to the laboratory. The records will provide the necessary documentation to trace sample possession from the time of collection through testing and reporting. A typical chain of custody record is shown on Plate B-1. As a minimum, the record will include the following information:

- o sample numbers
- o signature of collector
- o date and time of collection
- o place and address of collection
- o waste type
- o signature of persons involved in chain of possession
- o inclusive dates of possession

Also, the samples will be accompanied by a sample analysis request sheet as shown on Plate B-2.

The scans will be accomplished on a part of the samples submitted to the U.S. Bureau of Mines in order to establish a graphical trace for the indicated percentages of TATB. Data from subsequent tests on waste within Area S will then be comparted with the original trace to determine the percentage of TATB in a sample.

Infrared scans will be performed by Hercules, Inc. with a Perkin-Elmer 567 Infrared Spectrophotometer scanning between 4,000 to 700 numbers.

Distilled Water Leachate Test

Distilled water leachate tests will be made as described for a solid waste by TDWR[2], i.e., a waste material without associated free liquid. Essentially, the test consists of placing a representative sample in ionized water and, after a specified period of time, filtering the supernate solution through a 0.45 micron filter. Material retained on the filter will then be subject to quantitative analysis. The resulting leachate will be analyzed for total organic carbon, ammonia, chromium, lead, cadmium, arsenic, mercury, silenium and silver. For comparision, background sample analyses will be performed on soil samples obtained adjacent to the impoundments. Analyses will be accomplished by a local laboratory in accordance with established USEPA procedures.

Impact Sensitivity Tests

These tests will be conducted by Hercules, Inc. on portions of the samples subjected to infrared scans. The test is conducted on a small volume of oven dried soil in a Bureau of Mines Impact Sensitivity Apparatus. Steel balls of various weights (up to 3.98 pounds) are dropped from various heights (up to 30 inches) in an attempt to initiate a positive response, that is, an explosion, smoke, odor, etc. The apparatus has a maximum range of 119.4 inch-pounds. Ten consecutive trials are conducted for each test condition.

RECORD KEEPING AND REPORTING

Upon conclusion of the testing, a formal report will be prepared by Shannon & Wilson, Inc. The report will be submitted to Texas Department of Water Resources for reclassification of the material within Area S.

RESPONSE TO TESTING

If the soil is reactive, it will be destroyed by burning. However, if the material is non-reactive, Texas Department of Water Resources personnel will be contacted so that the material can be downgraded to a Class Two or Class Three waste.

REFERENCES

1. "Groundwater Quality Assessment Area F - Final Submittal, Naval Weapons Industrial Reserve Plant, McGregor, Texas," Shannon & Wilson, Inc. report to Southern Division Naval Facilities Engineering Command, February 1983. Report No. J-104.

2. "Texas Department of Water Resources Industrial Solid Waste Management Technical Guide No. 1". Texas Department of Water Resources, Issue 5376, revised 5/11/82.

3. "Test Methods for Evaluating Solid Waste Physical/Chemical". U.S. Department of Environmental Protection Agency, Office of Solid Waste Emergency Response, Washington, D.C., July 1982, SW-846, 2nd Edition.

ENVIRONMENTAL PROTECTION AGENCY
Office of Enforcement

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME	NO. OF CONTAINERS	REMARKS
SAMPLERS: *(Signature)*			

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

CHAIN OF CUSTODY CONTROL RECORD

PLATE B-1

Note: This plate taken from Ref. 3

SAMPLING ANALYSIS REQUEST

PART I: Field Section

Collector _____ Date Sampled _____ Time _____ hours

Affiliation of Sampler _____

Address _____
number street city state zip

Telephone (___)_____ Company Contact _____

LABORATORY SAMPLE NUMBER	COLLECTOR'S SAMPLE NO.	TYPE OF SAMPLE*	FIELD INFORMATION**

Analysis Requested _____

Special Handling and/or Storage _____

PART II: LABORATORY SECTION**

Received by _____ Title _____ Date_____

Analysis Required _____

* Indicate whether sample is soil, sludge, etc.
**Use back of page for additional information relative to sample location.

Note: This plate adapted from Ref. 3

Figure 4. Example of hazardous waste sample analysis request sheet.

SAMPLING ANALYSIS SHEET

§ 261.23 Characteristic of reactivity.

(a) A solid waste exhibits the characteristic of reactivity if a representative sample of the waste has *any* of the following properties:

(1) It is normally unstable and readily undergoes violent change without detonating.

(2) It reacts violently with water.

(3) It forms potentially explosive mixtures with water.

(4) When mixed with water, it generates toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.

(5) It is a cyanide or sulfide bearing waste which, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.

(6) It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.

(7) It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.

(8) It is a forbidden explosive as defined in 49 CFR 173.51, or a Class A explosive as defined in 49 CFR 173.53 or a Class B explosive as defined in 49 CFR 173.88.

(b) A solid waste that exhibits the characteristic of reactivity, but is not listed as a hazardous waste in Subpart D, has the EPA Hazardous Waste Number of D003.

Note: Part 261.23 taken from "Federal Register" Volume 45, No. 98, Monday, May 19, 1980

CHARACTERISTICS OF REACTIVITY
PART 261.23

SHANNON & WILSON, INC.
Geotechnical Consultants

M-641-03

PLATE B-3

APPENDIX III

PROPOSED ALTERNATE TO CLOSURE PLAN PROCEDURE
NWIRP-McGREGOR, TEXAS

CONSULTANTS
William L. Shannon, P.E.
Stanley D. Wilson, P.E.

SHANNON & WILSON, INC.
Geotechnical Consultants
Suite 276 • 11500 Olive Boulevard • St. Louis, Missouri 63141-7126 • Telephone (314) 872-8170

March 22, 1983 J-104-02

Ms. Ann McGinley
Texas Department of Water Resources
P.O. 13087
Capitol Station
Austin, Texas 78711

Re: Proposed Alternate to Closure Plan Procedure
NWIRP - McGregor, Texas

Dear Ms. McGinley:

Closure of the three surface impoundments in Area F is proceeding in accordance with the seven phase process given in correspondence of January 18, 1983.[1] Briefly, they are:

I. Decontamination of flumes and removal and decontamination of impoundment piping;

II. Removal of impoundment waste water;

III. Removal and disposal of waste TATB;

IV. Sampling the remaining sediment waste, testing for reactivity, and preparation of a delisting petition;

V. Removal of sediment waste to temporary storage pending a decision on the delisting petition;

VI. Backfilling of the impoundments; and

VII. Disposal of the sediment based on the outcome of the delisting petition.

---

[1] "Closure Plan, NWIRP McGregor;" Shannon & Wilson, Inc. correspondence to Texas Department of Water Resources, January 18, 1983.

Work commenced on January 25, 1983 and to date, Phases I, II, and part of Phase III have been completed.

Based on preliminary impact sensitivity and ignition tests performed after removal of water from the impoundments and accomplishment of some TATB excavation, it appears that the sediment below the TATB sludge does not possess the characteristics of an explosive waste and is nonhazardous. Therefore, we are proposing an alternate to the closure plan. Phases I through III for the removal of the TATB would remain as given in the Closure Plan of January 18, 1983. The purpose will be to demonstrate that the impoundments are clean after removal of TATB sludge. If TATB is not present in the sediment underlying the TATB, the sediment will remain in the impoundments. The cleanliness of the impoundments would be verified by test procedures given in the following sections.

After removal of the TATB, the remaining sediment will be sampled at randomly selected grid points and infrared scans and leachate tests accomplished. A sampling and analysis plan giving sampling techniques, frequency, and testing methods is being developed and will be forwarded to the Texas Department of Water Resources for comment prior to initiating sampling. Sampling will be performed in general accordance with published EPA Guidelines.[2] As a minimum, six samples from each impoundment will be tested. Additional samples will be obtained and tested at locations other than those randomly selected if requested by TDWR Region III personnel during field inspection.

---

[2]"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods;" published by the U. S. Environmental Protection Agency; SW-846; Second Edition, 1982.

Infrared scans will be conducted by the facility contractor, Hercules Incorporated, using in-house personnel and equipment. Previous testing has demonstrated that the infrared tests can detect TATB to as low as 1 percent. Leachate tests will be conducted in accordance with procedures given by Texas Department of Water Resources.[3] The resulting filtered leachate will be tested by infrared scanning for the presence of TATB.

If test data indicate the absence of TATB, the sediment will be considered a Class III material. Closure will then be completed by covering the ponds and the wells will be grouted as given in Phase VI of the initial closure plan. If TATB is found in the sediment, procedures will be continued as outlined in the initial closure plan.

We realize that field conditions will have significant impact on the acceptability of the proposed alternate. Additional tests may be necessary. However, we would appreciate if you would indicate your opinions regarding this subject including agreements or disagreements. Particularly, we wish to determine the acceptability of the proposed testing methods.

---

[3]"Texas Department of Water Resources Industrial Solid Waste Management Technical Guide No. 1;" by Texas Department of Water; Issue 5376; revised 5/11/82.

We appreciate your cooperation and look forward to the successful closure of the impoundments.

Very truly yours,

SHANNON & WILSON, INC.

Ronald M. Eckelkamp, P.E.
Principal Engineer

RME:mj

Copies to: Ms. Kathleen Anglin
Hercules Incorporated

Mr. Ken Chacey
SOUTHNAVFACENGCOM

APPENDIX IV

CLOSURE OF AREA F
WEST SURFACE IMPOUNDMENTS
NWIRP-McGREGOR, TEXAS

CONSULTANTS
William L. Shannon, P.E
Stanley D. Wilson, P.E

SHANNON & WILSON, INC.
Geotechnical Consultants
Suite 276 • 11500 Olive Boulevard • St. Louis, Missouri 63141-7126 • Telephone (314) 872-8170

January 25, 1984 J-104-02

Texas Department of Water Resources
P.O. Box 13087
Capital Station
Austin, Texas 78711

Attention: Ms. Ann McGinley

CLOSURE OF AREA F
WEST SURFACE IMPOUNDMENTS
NWIRP - MCGREGOR, TEXAS

Dear Ms. McGinley:

Closure of three hazardous waste surface impoundments on the west side of Area F of the Naval Weapons Industrial Reserve Plant near McGregor, Texas (located as shown on Attachment 1) is completed. Submitted herewith is a "Certification of Closure" letter as required by Section 335.216 of the Texas Administrative Code and as set forth by the Texas Water Development Board in Industrial Solid Waste Rules. The term "certification" used herein is a professional opinion and is as defined in the Federal Register, Vol. 47, No. 143; Monday, July 26, 1982, page 32349, 40 CFR Part 260.10.

Further discussion regarding the term "certification" is given in the above referenced Federal Register on pages 32289 and 32290 as part of a preamble. A copy is attached as Attachment 2.

Closure was authorized by Mr. Henry Davis, Executive Director of Texas Department of Water Resources (TDWR), by correspondence of November 23, 1982. A copy of letter is enclosed as Attachment 3. Closure was accomplished in accordance with a revised closure plan submitted to Ms. Ann McGinley of TDWR by Shannon & Wilson, Inc. on June 27, 1983.

M. Mike Alizadeh, P.E.
Senior Vice President and
Central Regional Director

J. Ronald Salley, P.E.
Vice President

Christopher B. Groves, P.E.
Associate

Removal of contaminated material was accomplished by Hercules, Inc. as noted in correspondence from Hercules, Inc. enclosed as Attachment 4.

The base of the impoundments was observed by representatives of TDWR, Shannon & Wilson, Inc. and Hercules, Inc. on July 12, 1983. At that time the impoundments were observed to be clean. A memo from TDWR dated August 9, 1983 (attached herein as Attachment 5) states, "Clean-up operations appear to have been satisfactory and the impoundments free from contaminated material." Permission was given by TDWR to fill the impoundments. A representative of TDWR was again on the site on November 14, 1983 to observe that the impoundments were properly closed. A memo concerning closure is given in Attachment 6.

Hercules, Inc. removed the waste from the impoundments in accordance with the approved closure plan. Based on this information, visual determinations that contaminated materials were removed from the impoundments, and the subsequent backfilling of the impoundments, it is our opinion that closure of the impoundments is complete.

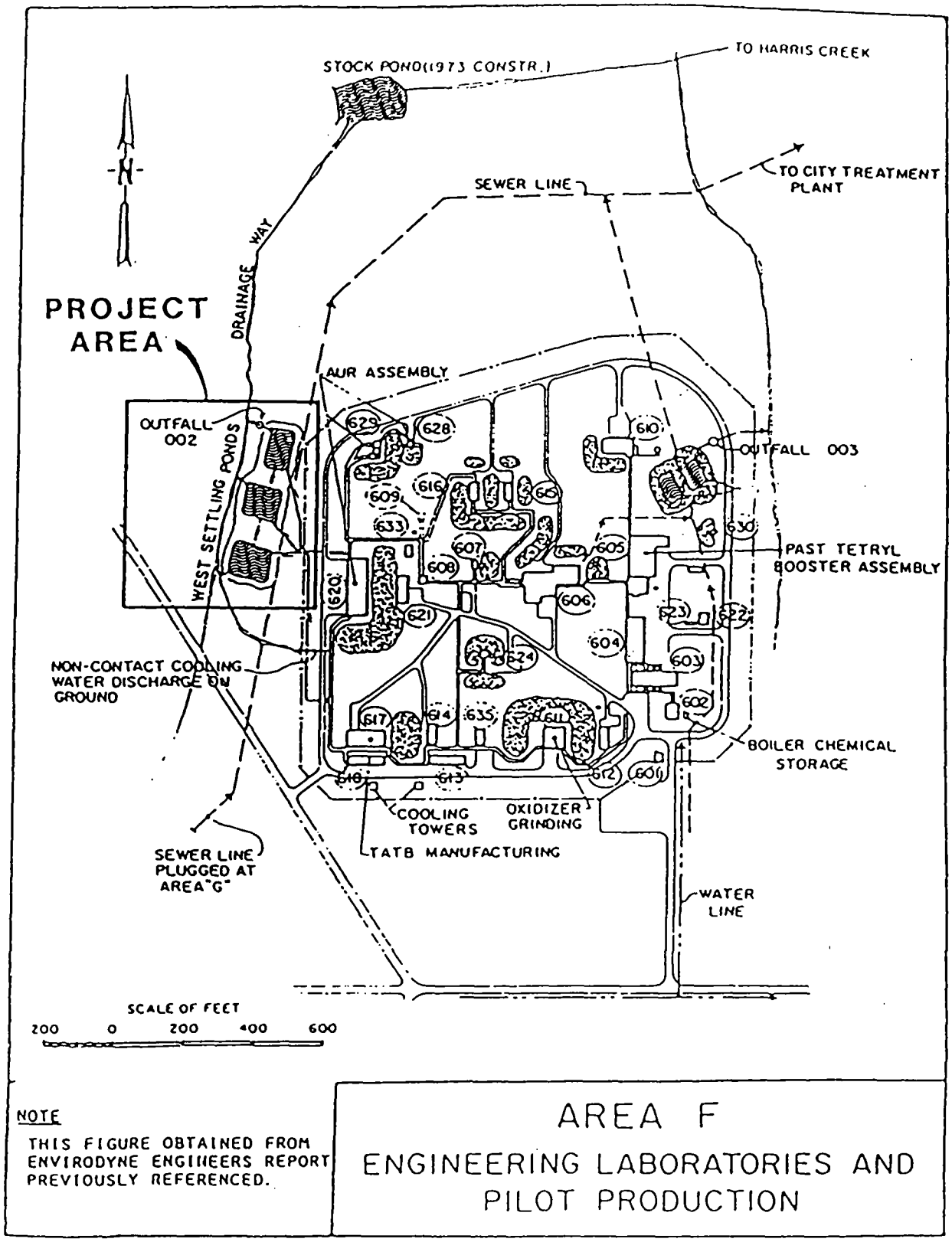
We trust that this is the information that you require. Should you have any questions or comments, please contact me.

Very truly yours,

Ronald M. Eckelkamp, P.E.
Shannon & Wilson, Inc.

Kathleen Anglin
Hercules, Inc. (Operator)

D. R. Spell
Southern Division Naval Facilities
Engineering Command



NOTE

THIS FIGURE OBTAINED FROM ENVIRODYNE ENGINEERS REPORT PREVIOUSLY REFERENCED.

AREA F

ENGINEERING LABORATORIES AND PILOT PRODUCTION

Attachment 1

2. *Certification.* The terms "certification", "certify", and "certified" are used throughout the regulations, including those promulgated today, to refer to the rendering of a professional opinion concerning compliance with a requirement of the regulations by a qualified professional in the field. Commenters have suggested that courts sometimes interpret these terms to imply that certification is equivalent to a guarantee or warranty, thus relieving other parties (e.g., owners and operators) of their responsibilities under regulations as a result of such certifications. This was not intended by the Agency in the various RCRA certification requirements. By requiring a certification, the Agency is seeking an opinion from a professional qualified in the field but does not intend to relieve owners and operators from their responsibilities under the regulations. The definition does not address the potential liabilities of the certifying party. This is a matter to be resolved between the certifying party and the owner or operator in accordance with applicable law. Since EPA still believes the terms "certification" and "certify" accurately denote the Agency's intention, EPA is choosing to define the terms to eliminate possible legal misinterpretation.

TEXAS DEPARTMENT OF WATER RESOURCES
1700 N. Congress Avenue
Austin, Texas

TEXAS WATER DEVELOPMENT BOARD
Louis A. Beecherl, Jr., Chairman
George W. McCleskey, Vice Chairman
Glen E. Roney
W. O. Bankston
Lonnie A. "Bo" Pilgrim
Louie Welch

Harvey Davis
Executive Director

TEXAS WATER COMMISSION
Lee B. M. Biggart, Chairman
Felix McDonald
John D. Stover

November 23, 1982

Mr. W. H. Fuller
Hercules Incorporated
Hercules Aerospace Division
P. O. Box 548
McGregor, Texas 76657

Dear Mr. Fuller:

Re: Solid Waste Registration No. 30056
Hercules Reference No. 82HT1240

This letter is in response to your letter of October 25, 1982 and a meeting held November 10, 1982 between representatives of Hercules, Inc. and Texas Department of Water Resources (TDWR). The Department staff has reviewed the closure plan submitted for three surface impoundments west of Building F-620 and feels that this proposal satisfies the requirements of Subchapters A, J and N of the Industrial Solid Waste Rules pertaining to waste facility closure. This letter authorizes Hercules, Inc. to initiate closure activities for the surface impoundments.

At the project's completion, TDWR requests that Hercules, Inc. obtain certification from a professional engineer that the impoundment closure has been performed according to the specifications of your closure plan. In addition, we also request that you provide this agency with copies of the pond bottom analysis in order to demonstrate that the hazardous wastes have been removed.

We ask that you contact our TDWR District 3 Office in Waco at 817/753-3688 at least one week prior to the excavation of the impoundment bottoms so that they will have an opportunity to observe your work. Should you have any questions about this matter, contact Ms. Ann McGinley of our Solid Waste Compliance Unit at 512/475-5516.

Sincerely yours,

Harvey Davis
Executive Director

ccs: Mr. Greg Tipple, Permits Division
Texas Department of Water Resources District 3 Office

HERCULES

Hercules Incorporated
Hercules Aerospace Division
P. O. Box 548
McGregor, TX 76657
(817) 840-2811

November 7, 1983

Shannon & Wilson, Inc.
11500 Olive Boulevard
St. Louis, Missouri 63141

Attention: Mr. Ronald M. Eckelkamp, P.E.

Regarding: Excavation of Waste Material
Area F - West Surface Impoundments
NWIRP-McGregor, Texas

Dear Ron:

Hercules Incorporated has removed TATB contaminated sediments and the underlying sand bedding from the three west surface impoundments of Area F. The material was excavated to the top of weathered rock with mechanical equipment and transported to Area S by Hercules Incorporated employes under the direction of the Hercules Incorporated environmental specialist. Precautions were taken to prevent contamination during transportation and to the best of our knowledge, all contaminants were moved to Area S.

The excavated impoundments were observed by Mr. Don Wyrick of Texas Department of Water Resources, Mr. Ronald Eckelkamp of Shannon & Wilson, Inc., and Ms. Kathleen Anglin of Hercules Incorporated on July 12, 1983. Mr. Wyrick observed that the TATB contaminated sediments and sand were removed and indicated that no additional testing would be necessary. Mr. Wyrick subsequently gave verbal permission to fill the impoundments on July 12, 1983. Written confirmation of this permission was noted in a memo to Ms. Ann McGinley of the Texas Department of Water Resources on August 9, 1983.

The impoundments were back filled by Hercules Incorporated employes. Filling and contouring efforts were completed during the last week of October, 1983. Final inspection by Don Wyrick is expected to occur during the week of November 14th.

Very truly yours,

Kathleen H. Anglin

Kathleen H. Anglin
Environmental Specialist

KHA:lar

Attachment 4

Texas Department of Water Resources

INTEROFFICE MEMORANDUM

TO : Ann McGinley, Solid Waste & Spill Response DATE: August 9, 1983

THRU :

FROM : Don Wyrick, Environmental Quality Specialist, District 3

SUBJECT: Hercules Incorporated, McGregor, Texas, S.W. Registration No. 30056--
Closure of Surface Impoundments in Area F

On July 7, 1983, the writer contacted Mrs. Kathleen Anglin, Environmental Specialist, Hercules, Inc., and conducted an inspection of the three (3) surface impoundments located in the area previously designated as Area F. The purpose of the inspection was to ascertain status of closure operations, as proposed by said company and approved by our Department.

According to Mrs. Anglin, approximately 1,434 cubic yards of contaminated sludge and soil was excavated from the impoundments. Clean-up operations appear to have been satisfactory and the impoundments free from contaminated material.

The waste sludge and soil was removed and taken to an on-site area previously designated as area S, a permitted open controlled incineration facility. Ultimate disposal of the waste material is pending chemical analyses of samples collected by said company and appropriate classification, based on present characteristics. By letter of July 25, 1983, said company was authorized to proceed with proposed plans to burn the solid waste material at Area S.

Mrs. Anglin was informed that proposed plans to fill, cover and properly close-out the impoundments could begin.

This report is for your information. If we can be of any further assistance, please contact our office.

DW:tb

Don Wyrick

Don Wyrick

Joe R. Morgan

Joe R. Morgan, Supervisor

Attachment 5

Texas Department of Water Resources

INTEROFFICE MEMORANDUM

TO : Gary Schroeder, Chief, Solid Waste and Spill RespDATE: November 29, 1983

THRU :

FROM : Don Wyrick, Environmental Quality Specialist, District 3

SUBJECT: Hercules Incorporated, McGregor, Texas, Solid Waste Registration No. 30056--
Closure of Surface Impoundments in Area F

RE: Interoffice Memorandum dated August 9, 1983 (DW:tb); copy attached.

On November 14, 1983, the writer contacted Mrs. Kathleen Anglin, Environmental Specialist, Hercules Inc. and conducted a follow-up inspection of three (3) surface impoundments located in the area previously designated as Area F. The purpose of the inspection was to ascertain status of closure operations.

The surface impoundments have been filled, covered and properly closed out as proposed by Hercules, Inc. and approved by our Department.

This report is for your information. If we can provide any additional information, please contact our office.

DW:tb

Attachment

Don Wyrick

Joe R. Morgan, Supervisor

Attachment 6

APPENDIX V

WASTE DISPOSAL IN AREA S

February 16, 1984

Ms. Kathleen H. Anglin
Hercules Incorporated
P. O. Box 548
McGregor, Texas 76657

Dear Ms. Anglin:

Re: Solid Waste Registration No. 30056

We received your letter of January 27, 1984 enclosing a final closure plan with designs and specifications for the triamino trinitro benzene (TATB) and soil waste currently stored in Area S. Department staff have reviewed the waste characteristics and the landfill designs and determined them to be compatible. Hercules Inc. may initiate final disposal of the TATB waste which no longer meets the characteristic of reactivity because of mixing with a nonhazardous waste.

Should you have any questions about this matter, contact Ms. Ann McGinley of our Solid Waste Enforcement Unit at 512/475-5695.

Sincerely,

Gary D. Schroeder, P.E., Chief
Solid Waste and Spill Response Section
Enforcement and Field Operations Division

ANM:py

cc: Texas Department of Water Resources District 3 Office

APPENDIX VI

REACTIVITY TESTING
TATB AND SOIL MIXTURE
NWIRP-McGREGOR, TEXAS

CONSULTANTS
William L. Shannon, P.E.
Stanley D. Wilson, P.E.

SHANNON & WILSON, INC.
Geotechnical Consultants
Suite 276 · 11500 Olive Boulevard · St. Louis, Missouri 63141-7126 · Telephone (314) 872-8170

Arpil 2, 1984 J-104-02

Texas Department of Water Resources
P.O. Box 13087
Capitol Station
Austin, Texas 78711

Attention: Ms. Ann McGinley

RE: Reactivity Testing
TATB and Soil Mixture
NWIRP-McGregor, Texas

Dear Ms. McGinley:

Submitted herewith is our report on reactivity testing of triaminotrinitrobenzene (TATB) samples from the Naval Weapons Industrial Reserve Plant in McGregor, Texas. Samples of soil mixed with 1, 8, and 15 percent TATB were tested to demonstrate that a mixture is nonreactive if it contains less than a specified percentage of TATB. Reactivity in this case is as defined in Title 40 Code of Federal Regulations, Part 261.23(a) and given herein as Attachment 1. Infrared scans of material excavated from the surface impoundments indicated TATB contents less than 15 percent.

Test data given herein demonstrate that an inert material such as soil, when mixed with as much as 15 percent TATB, is nonreactive.

Test Program

General Overview. Since few definitive test protocols are available in regulations for the determination of reactivity, our program was developed in conjunction with U.S.E.P.A. and

U.S. Bureau of Mines. The latter agency was included since it is under contract with U.S.E.P.A. to develop test procedures relating to the explosivity of reactive materials. A sample of soil adjacent to surface impoundments was obtained, mixed with TATB and tested for the characteristics of reactivity given in Title 40CFR Part 261.23(a). Additional detail regarding the test program and testing laboratories are given in the following paragraphs.

Test Laboratories. Testing was accomplished by the U.S. Bureau of Mines at its Pittsburgh, Pennsylvania Research Center and General Engineering Laboratories of Charleston, South Carolina. As mentioned previously, the U.S. Bureau of Mines laboratory is developing procedures for U.S.E.P.A. with regard to test methods for explosivity characteristics as given by 40CFR.261.23(a)(6) and (7). The remaining tests for 40CFR.261.23(a)(1) through (5) were performed by General Engineering Laboratories in accordance with protocols developed through conversation with U.S.E.P.A in Washington, D.C. General Engineering Laboratories has an open-end contract to perform environmental laboratory testing services for the Southern Division Naval Facilities Engineering Command. The tests were performed under this jurisdiction.

Sample Selection. The program was developed to determine the point at which, if any, a mixture of TATB and soil became reactive. Mixtures of 1, 8, and 15 percent TATB with soil were selected. The upper threshold was determined based on background data generated by Hercules, Inc. which indicate that the material removed from the surface impoundments contains less than 15 percent TATB.

Soil from adjacent to the surface impoundments was excavated and allowed to air dry. Bulk samples of the soil and TATB were sent in separate containers to the U.S. Bureau of Mines by regulated carrier in accordance with DOD and other federal regulations. Samples were mixed by U.S. Bureau of

Mines. Samples for General Engineering Laboratories were of smaller volume and were therefore pre-mixed in the laboratories of Hercules, Inc. The samples were shipped in accordance with government regulations.

Test Methods. As stated previously, test methods were developed in conjuncton with U.S.E.P.A and the U.S. Bureau of Mines.

General Engineering Laboratories tested for the characteristics given in Title 40CFR Part 261.23(a)(1) through (5). These characteristics include general stability, reaction with water, the formation of explosive mixtures when mixed with water, generation of toxic gas vapors or fumes, and cyanide or sulfide gas generation when exposed to basic or acidic conditions. Test procedures used by General Engineerng Laboratories are given in Attachment 2.

The test procedures developed by the U.S. Bureau of Mines have been recommended to the U.S.E.P.A as suitable for determination of two of the explosive characterisics of a reactive waste; 40 CFR Part 261.23(a)(6) and (7). These two tests are concerned with a material's ability to detonate or explode upon being subjected to a strong initiating force or if heated and also, its ability to detonate or explode at a standard temperature and pressure. Additional details regarding test procedures of the U.S. Bureau of Mines are given in Attachment 3. The tests include the gap test for solids and liquids and the internal ignition test (also called deflagration-to-detonation transition test). These two tests were recommended to and accepted by the United Nations Group of Experts on Explosives as suitable for determining whether a substance possesses explosive properties.

Test Data

Tests by General Engineering Laboratories for reactivity characteristics given in 40CFR Part 261.23(a)(1) through (5) were negative, that is, the material did not demonstrate a

reaction to test procedures. A report "Certificate of Analysis" from General Engineering Laboratories is included herein as Attachment 4.

Tests performed by the U.S. Bureau of Mines for explosive characteristics as given in 40CFR Part 261.23(a)(6) and (7) did not indicate a reactive material. As per the U.S. Bureau of Mines report included herein as Attachment 5, "In no case were any results indicating reactivity observed; i.e., in the gap test the witness plate was not damaged nor was fragmentation or a stable rate of propagation of the shock wave in the samples observed (fragmentation and the detection of a decaying shock wave in the immediate vicinity (10 to 15 cm) of the high explosive booster is characteristic of even completely inert substances such as water and is discounted); in the internal ignition test no fragmentation, rupture, or bulging of the test bomb was observed and the entire sample remained unconsumed." The U.S. Bureau of Mines report further goes on to state, "The negative results as described above were obtained consistently in each of three trials with each of three sample mixtures consisting of 1, 8, and 15 percent of TATB, respectively."

Conclusions

Based on data generated during these tests, it is our conclusion that mixtures of soil containing 15 percent or less TATB are nonreactive. The tests performed by General Engineering Laboratories and U.S. Bureau of Mines did not indicate any positive response. Further, for the characteristics tested by the U.S. Bureau of Mines, they state: "It is concluded that the soil contaminated with up to 15 percent TATB does not exhibit the properites described in 40 CFR261.23(a)(6) and (7) as contributing to the characterisic of reactivity, according to the test and critieria which we recommended to E.P.A. for that purpose." Further, since the mixture of TATB and soil is not a forbidden explosive as defined in 49CFR173.51 or a Class A

explosive as defined in 49CFR173.53 or a Class B explosive as defined in 49CFR173.88, it is our opinion that soil contaminated with 15 percent or less TATB is nonreactive.

We trust that this is the information you require. Should you have any questions or comments, please do not hesitate to contact me.

Very truly yours,

SHANNON & WILSON, INC.

Ronald M. Eckelkamp, P.E.
Principal Engineer

RME:pp

Attachments as noted

cc: Ms. Kathleen Anglin, Hercules, Inc.
Mr. Ken Chacey, Southern Division Naval Facilties Engineering Command
Dr. John Goulias

§ 261.23 **Characteristic of reactivity.**

(a) A solid waste exhibits the characteristic of reactivity if a representative sample of the waste has *any* of the following properties:

(1) It is normally unstable and readily undergoes violent change without detonating.

(2) It reacts violently with water.

(3) It forms potentially explosive mixtures with water.

(4) When mixed with water, it generates toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.

(5) It is a cyanide or sulfide bearing waste which, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.

(6) It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.

(7) It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.

(8) It is a forbidden explosive as defined in 49 CFR 173.51, or a Class A explosive as defined in 49 CFR 173.53 or a Class B explosive as defined in 49 CFR 173.88.

(b) A solid waste that exhibits the characteristic of reactivity, but is not listed as a hazardous waste in Subpart D, has the EPA Hazardous Waste Number of D003.

Engineering Consulting
Chemical Analysis

GENERAL ENGINEERING LABORATORIES
1313 Ashley River Road
Charleston, S.C. 29407

P.O. Box 30712
Charleston, S.C. 29417
Phone (803) 556-8171

REACTIVITY TEST PROCEDURES

These Test Procedures cover the characteristics of Reactivity specified in 40 CFR 261.23 (1) through (5). They were developed as a result of conversations with the US EPA in Washington.

40 CFR 261.23(1): It (the solid waste) is normally unstable and readily undergoes violent change without detonating.

Procedure 1a: Heat approx 0.1 gm of sample to 120C and observe for reactions or changes in appearance indicating thermal decomposition. Observations should be made at 10 minute intervals over a one hour period.

Procedure 1b: Place approximately 0.1 gm of sample on a flat steel surface and strike forcefully with a hammer and note reactions on impact.

40 CFR 261.23(2): It (the solid waste) reacts violently with water.

Procedure 2: Place sufficient sample in a 30 ml beaker to cover the bulb of a thermometer and note the temperature when thermal equilibrium is achieved. Carefully and very slowly add sufficient water to completely wet the sample. Mix well and note any increase in temperature over a period of approximately one hour.

40 CFR 261.23(3): It (the solid waste) forms potentially explosive mixtures with water.

Procedure 3: Take the wet sample from Procedure 2 and repeat Procedures 1a and 1b.

40 CFR 261.23(4): When mixed with water, it (the solid waste) generates toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.

Note: There is at this point no "quantity" defined by EPA as being sufficient to present a danger to human health or the environment.

Procedure 4: Add an aliquot of sample to slightly excess water and capture any gas produced. Note the volume of gas. Absorb the gas and determine its' composition (i.e. CN, H2S, etc.)

Engineering Consulting
Chemical Analysis

GENERAL ENGINEERING LABORATORIES
1313 Ashley River Road
Charleston, S.C. 29407

P.O. Box 30712
Charleston, S.C. 29417
Phone (803) 556-8171

40 CFR 261.23(5): It (the solid waste) is a cyanide or sulfide bearing waste which, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.

Note: There is at this point no "quantity" defined by EPA as being sufficient to present a danger to human health or the environment.

Procedure 5a: Add an aliquot of sample to excess HCl solution with pH = 2 and capture any gas produced. Absorb the gas and test for CN and H2S.

Procedure 5b: Add an aliquot of sample to excess NaOH solution with pH = 12.5 and capture any gas produced. Absorb the gas and test for CN and H2S.

fc:reac.proc2

5

TEST 1(a)(iii) GAP TEST FOR SOLIDS AND LIQUIDS

5.1 INTRODUCTION

This test is designed to measure the shock sensitivity and detonation propagation of a solid or liquid substance. The sample is loaded in a steel tube of specific dimensions and is subjected to the shock wave generated by the detonation of a pentolite booster. Three criteria are used to evaluate the results of the test.

5.2 APPARATUS AND MATERIALS

5.2.1 SOLIDS

The apparatus for the gap test is shown in Fig 5.1. The test sample is contained in a cylinder consisting of a 40.6 cm length of cold-drawn seamless carbon steel "mechanical" tubing 4.76 cm o.d. with a wall thickness of 0.56 cm and an i.d. of 3.65 cm. A mild steel witness plate 15.24 cm square and ^.32 cm thick is mounted at the upper end of the sample tubing and separated from it by spacers 0.16 cm thick. The bottom of the cylinder is closed with two layers of .008 cm thick polyethylene sheet held in place with gum rubber bands and polyvinyl chloride electrical insulating tape. There is no other gap between the pentolite booster and the test sample as used in this test. A continuous velocity of detonation[1/] probe made of thin aluminium tube with an axial resistance wire having a resistance of 3.0 ohms/cm is mounted on the wall of the sample tubing. The outer tubing of the probe is crimped against the inner wire at the lower end forming a resistor. When this assembly is inserted in a medium which transmits a shock wave, the outer wall crushes against the inner wire, as the wave moves up the tubing shortening the effective length and changing the resistance. If a constant current (usually .06 amperes) is made to flow between the outer and inner conductors, the voltage between them is proportional to the effective length and can be recorded as a function of time using an oscilloscope. The slope of the oscilloscope trace is thus proportional to the velocity of the shock wave.

1/ Ribovich, J., R. W. Watson, and P. C. Gibson. Instrumented Card-Gap Test. AIAA Journal, v. 6, no. 7, 1968, pp. 1282-1283.

5.2.2 LIQUIDS

The apparatus for the gap test for liquids is the same as that for solids except that a method of injecting bubbles into the liquid sample is provided. The experimental set-up is given in Fig 5.2. The bubbles are injected by means of a 2.35 cm diameter loop of vinyl plastic tubing of the type used for medical catheterization with an o.d. of 0.18 cm and a wall thickness of 0.04 cm located at the bottom of the sample. This loop is perforated with two rows of holes diametrically opposite to each other with the holes in each row spaced 0.32 cm apart. The holes are made by inserting a 0.13 cm diameter needle through the wall of the tubing. Due to the elastic nature of the tubing the holes contract almost completely when the needle is withdrawn, so the actual hole diameter is much smaller than 0.1 cm. The tubing is sealed at one end of the loop with epoxy cement and a length of the tubing from the other end of the loop is led outside to the air supply through a hole in the steel tubing, which is sealed with epoxy cement. Air is supplied at a pressure of 30 to 100 kilopascals to obtain a flow rate of 1.2 litres/minute. Where is it suspected that the sample may react with the steel tube, the inside of the tube is sprayed with a fluorocarbon resin coating.

5.3 PROCEDURE

The sample is loaded to the top of the steel tube. For liquid samples, adequate ullage should be allowed. Solid samples are loaded to the density attained by tapping the cylinder until further settling becomes imperceptible. The sample at 25°C is subjected to the shock wave generated by the detonation of a pentolite (50/50 PETN/TNT) pellet 5.08 cm in diameter and 5.08 cm thick having a density of 1.6 ± 0.05 grams/cc. The pentolite pellet is butted against the bottom of the test sample and initiated with a standard detonator (see Appendix 1). The detonator is held in place by a cork detonator holder. Three tests should be performed on each sample.

5.4 CRITERIA AND METHOD OF ASSESSING RESULTS

The criteria for propagation are:

(a) A stable propagation velocity greater than 1.5km/sec is observed.

(b) A hole is punched through the witness plate.

(c) The sample tube is fragmented along its entire length.

The overall test results are considered positive if any two of the three criteria are met.

5.5 EXAMPLES OF RESULTS

5.5.1 SOLIDS

Test Substance	Results zero gap, 25°C	Data Ref.
Nitroguanidine	+	X-2107
TNT, cast	+	M-1138
TNT, granular	+	M-1269
Watergel, amine nitrate sensitized	+	X-1842
Watergel,	+	X-1836
ANFO, commericial	+	X-1655
ANFO, aluminized	+	X-1591
ANFO, metallized	+	X-1635
Nitrocarbonitrate, low density	+	X-1697
Nitrocarbonitrate, high density	+	X-1877
AN prills, agricultural	-	X-1941
AN prills, industrial	-	X-1483
AN prills, porous, low density	+	X-1488
Ammonium perchlorate, 400u	-	-
Ammonium perchlorate, 45u	+	-
Benzoyl peroxide	-	-
M-Dinitrobenzene, fine crystals	+	-
2-4 Dinitrophenol, granular	+	-
2-4 Dinitrotoluene, granular	+	-
Guanidine nitrate, granular	+	-

5.5.2 LIQUIDS

Nitromethane	+	-
Nitromethane/Methanol, 55/45	-	-
Monomethylamine nitrate, 90% aq. sol.	+ (81°C)	-
Ethyleneglycol mononitrate, 50% aq. sol.	+	-

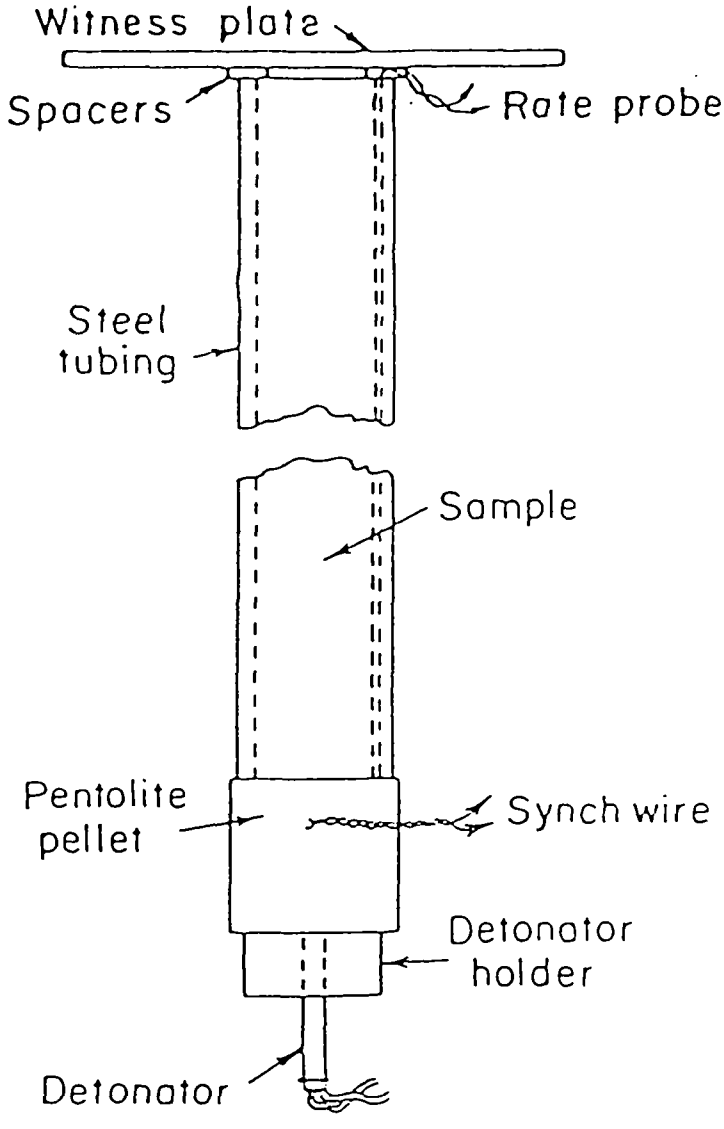


Fig 5.1 GAP TEST FOR SOLIDS Test Manual

TEST 1(b)(ii) INTERNAL IGNITION TEST

8.1 INTRODUCTION

The Internal Ignition Test is designed to determine the response of explosive materials to rapidly rising temperatures and pressures. The test, as used in Test Series 1 and 2, differs only in the weight of black powder used as an igniter. A 20 gram igniter is used in Test 1(b)(ii).

8.2 APPARATUS AND MATERIALS

8.2.1 The experimental arrangement is shown in Fig 8.1. The sample of substance to be tested is contained in a 45.7 cm length of "3 inch schedule 80" carbon (AS3 Grade B) steel pipe with i.d. of 7.37 cm, wall thickness 0.76 cm, capped both ends with a "3000 pound" forged steel pipe cap.

8.2.2 An igniter consisting of grade FFF_g black powder is located at the centre of the sample vessel. The igniter assembly consists of a cylindrical container 2.06 cm in diameter and 6.4 cm long, which is made from 0.054 cm thick cellulose acetate held together by two layers of nylon filament reinforced cellulose acetate tape. The igniter capsule contains a small loop formed from a 2.54 cm length of nickel-chromium alloy resistance wire 0.030 cm in diameter having a resistance of 0.35 ohms. This loop is attached to two insulated tinned copper leading wires. The tinned copper wires are 0.0_X6 cm in diameter whilst the overall diameter including insulation is 0.13 cm. These leading wires are fed through small holes in the wall of the pipe and are sealed with epoxy resin.

8.3 PROCEDURE

The sample at 25°C, is loaded into the pipe to a height of 23 cm. A 20 gram igniter (with its leads inserted through small holes in the pipe wall) is inserted into the centre of the pipe, the leads are pulled taut and then sealed with epoxy resin. The remainder of the sample is then loaded, and the top cap screwed on. For gelatinous samples, the substance is packed as nearly as possible to its normal shipping density. For granular samples, the substance is loaded to the density obtained by repeated tapping of the pipe against a hard surface. The igniter is fired by a current of 15 amperes obtained from a 20-volt transformer.

8.4 CRITERIA AND METHOD OF ASSESSING RESULTS

The criterion used in the interpretation of this test for test series 1 is that for a positive result either the pipe or at least one of the end caps be fragmented into at least two distinct pieces, i.e., results in which the pipe is merely split or laid open or in which the pipe or caps are distorted to the point at which the caps are blown off are considered to be negative results.

8.5 EXAMPLES OF RESULTS

8.5.1 SOLIDS

Test Substance	Results with 20 gram igniter	Data Ref.
TNT, granular	+	M-1269
Watergel	+	X-1985
ANFO, aluminized	+	X-1843
ANFO, metallized	+	X-1635
Nitrocarbonitrate, low density	+	X-1697
Nitrocarbonitrate, high density	+	X-1877
AN prills, agricultural	-	X-1941
AN prills, porous, low density	-	X-1488
Ammonium perchlorate, 45u	+	-
Benzoyl peroxide[a]	-	-
M-Dinitrobenzene, fine crystals[a]	+	-
2-4 Dinitrophenol, granular[a]	+	-
2-4 Dinitrotoluene, granular[a]	+	-
Guanidine nitrate, granular[a]	-	-

(a) = 24 gram igniter

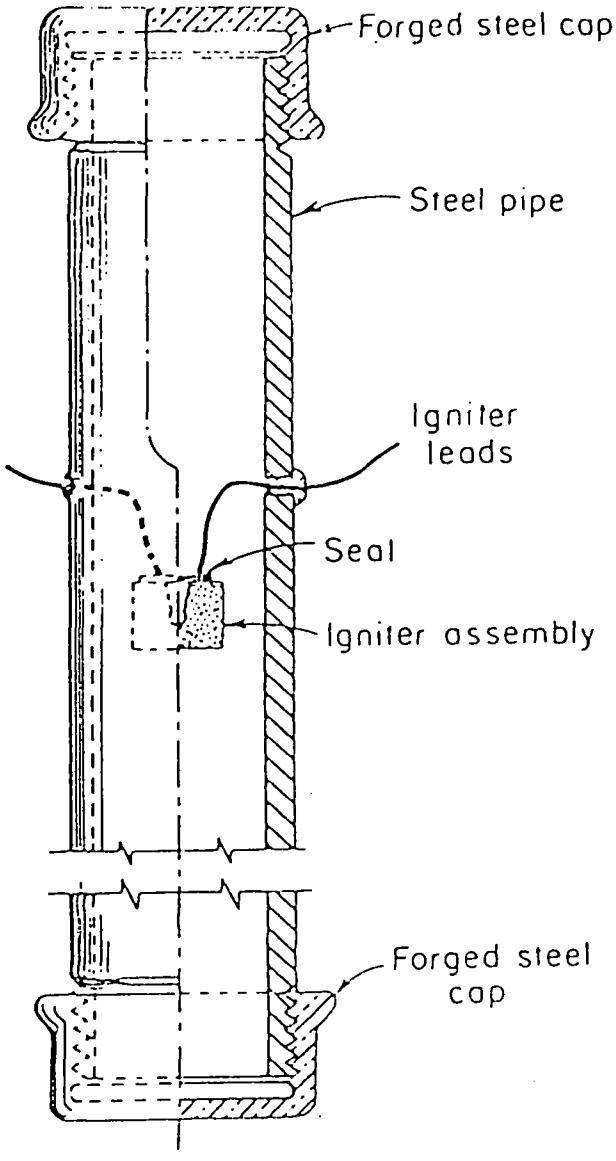


Fig 8.1 INTERNAL IGNITION TEST Test 1 (b)(i)

Engineering Consulting
Chemical Analysis

GENERAL ENGINEERING LABORATORIES
1313 Ashley River Road
Charleston, S.C. 29407

P.O. Box 30712
Charleston, S.C. 29417
Phone (803) 556-8171

Client	Southern Division Naval Facilities Engineering Command P.O. Box 10068 Charleston, SC 29411	**Date**	December 2, 1983
		P.O. No.	
		Requested by	Mr. Ken Chacey

CERTIFICATE OF ANALYSIS

Sample Type: TATB Contaminated Soil
Date Received: October 7, 1983
Delivered/Collected by: Hercules Laboratory
Shannon & Wilson, Inc.

Reactivity Characteristic (1)	Hercules No. 003 1% TATB	Hercules No. 004 8% TATB	Hercules No. 005 15% TATB
40 CFR 261.23(1)			
Thermal Effects	None	None	None
Impact Effects	None	None	None
40 CFR 261.23(2)			
Thermal Effects	None	None	None
40 CFR 261.23(3)			
Thermal Effects	None	None	None
Impact Effects	None	None	None
40 CFR 261.23(4)			
Gas Generation	None	None	None
40 CFR 261.23(5)			
Gas Generation with Base at pH = 12.5	None	None	None
Gas Generation with Acid at pH = 2	None	None	None
Presence of Cyanide	None	None	None
Presence of Sulfide	None	None	None

(1) Test protocols were developed through telephone conversations with US EPA

Respectfully Submitted by

George C. Greene, P.E., Ph.D.

cc: nvfc.mol

Attachment 4

United States Department of the Interior

BUREAU OF MINES

PITTSBURGH RESEARCH CENTER
COCHRANS MILL ROAD
POST OFFICE BOX 18070
PITTSBURGH, PENNSYLVANIA 15236

February 29, 1984

Mr. Ronald M. Eckelkamp
Principal Engineer
Shannon and Wilson, Inc.
Suite 276
11500 Olive Boulevard
St. Louis, MO 63141

Dear Mr. Eckelkamp:

We have applied the test procedures which we have recommended to the Environmental Protection Agency (EPA) as suitable for determination of two of the properties characterizing "reactivity" [Title 40 Code of Federal Regulations Part 261.23(a)(6) and (7)] to mixtures of the samples provided by your company. The test procedures referred to are the gap test for solids and liquids (at zero gap) and the internal ignition test (also called deflagration-to-detonation transition test) (at 20 gram ignitor mass), which have been recommended to and accepted by the United Nations Group of Experts on Explosives as suitable for determining whether a substance possesses explosive properties. Descriptions of these tests and their associated criteria from the United Nations test manual are attached.

The test samples were prepared from the samples of Triaminotrinitrobenzene (TATB) and soil supplied by you according to the procedures previously discussed, i.e., three samples consisting of 1, 8, and 15 percent, respectively of TATB in the air dried soil were prepared, and the tests described above were performed in triplicate on each sample. In no case were any results indicating reactivity observed; i.e., in the gap test the witness plate was not damaged nor was fragmentation or a stable rate of propagation of the shock wave in the samples observed [fragmentation and the detection of a decaying shock wave in the immediate vicinity (10 to 15 cm) of the high explosive booster is characteristic of even completely inert substances such as water and is discounted]; in the internal ignition test no fragmentation, rupture or bulging of the test bomb was observed, and the entire sample remained unconsumed.

The negative results described above were obtained consistently in each of the three trials with each of the three sample mixtures consisting of

1, 3, and 15 percent IATB, respectively. It is concluded that soil contaminated with up to 15 percent IATB does not exhibit the properties described in 40 CFR 261.23(a)(6) and (7) as contributing to the characteristic of reactivity, according to the tests and criteria which we recommended to EPA for that purpose.

Sincerely,

J. Edmund Hay
Research Supervisor, Explosives

Attachment